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AN ECONOMIC STUDY OF CROPS AND LIVESTOCK IN THE PURCHASE REGION OF KENTUCKY

BULLETIN NO. 289

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This bulletin is a joint contribution from the department of Farm Economics, Kentucky Agricultural Experiment Station and the Division of Farm Management and Costs, Bureau of Agricultural Economics, U. S. Department of Agriculture.

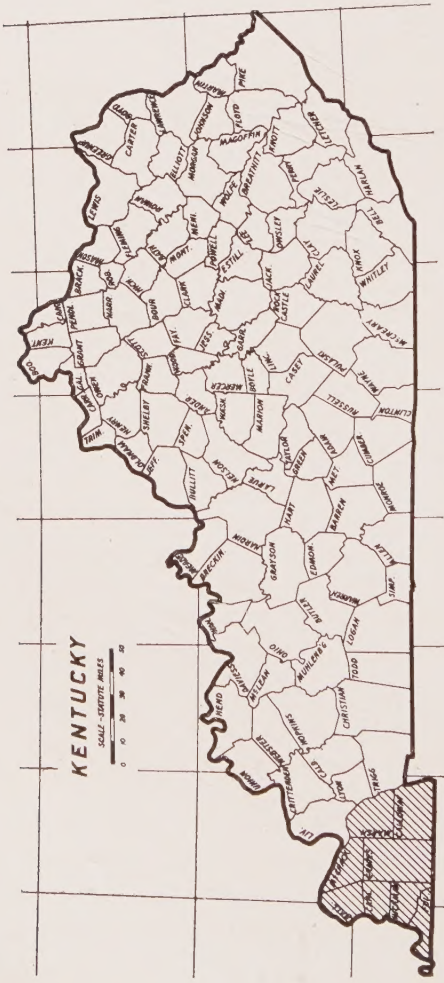

Fig. 1. The location of the Purchase Region of Kentucky is indicated by the shaded portion of the map.

BULLETIN NO. 289

(Research Bulletin)

An Economic Study of Crops and Livestock in the Purchase Region of Kentucky

By J. B. HUTSON[1], W. G. FINN and Z. L. GALLOWAY[2]

INTRODUCTION

The agriculture of the Purchase Region[3] of Kentucky has undergone changes in recent years. Tobacco has declined in importance and increased attention is being given to other sources of income. Expansion has taken place in production of dairy products, poultry products and fruits.

In 1919, the peak year for dark tobacco production, over 100,000 acres of that crop were grown in these eight counties. By 1924 the acreage devoted to tobacco had been reduced to 61,000 acres, and by 1927 further reductions had brought this figure below 25,000 acres. This is less than half the acreage grown either in 1909 or in 1899, and less than that grown in 1889 or 1879.

The strawberry acreage which, in 1919, was only about 100 acres, by 1924 had increased to 1,200 acres. During the same period the number of chickens on farms increased about 50,000 and the number of dairy cows became nearly 1,000 greater. Since 1924 the growth of these enterprises has been even more marked. Interest in dairying was greatly stimulated when a milk condensary was established at Mayfield in the spring of 1927. The

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[3] The Purchase Region of Kentucky is that part of the state lying west of the Tennessee River. It includes eight counties; Marshall, Calloway, Graves, McCracken, Ballard, Carlisle, Hickman and Fulton. (See Fig. 1.)

volume of business done by the McCracken County Strawberry Growers Association[4] in 1927 was over three times that done in 1924. Expansion has taken place in the acreage of peaches, apples and dewberries, and the acreage of sweetpotatoes and tomatoes has been materially increased in some sections. The poultry enterprise has experienced considerable growth, and several commercial hatcheries have recently been established.

Not all farmers who have stopped growing tobacco have turned to other farm undertakings. Many have left the farm altogether and have taken up other occupations. The United States census shows that the number of people living on farms in the region in 1925 was only about 84,000 as compared with 99,000 in 1920 and 104,000 in 1910.

These changes have come about largely as a result of low prices for dark tobacco. Demand for this type has decreased greatly in recent years. Being an export crop, used chiefly in the manufacture of chewing and smoking tobaccos, snuff and cigars, it has been meeting with disfavor for two reasons. First, the world-wide tendency toward the use of cigarettes has caused a curtailment in the consumption of tobacco in other forms. Second, the expansion of tobacco production in countries formerly importing large quantities of our dark crop has greatly reduced their purchases of this type.

It is likely, however, that some tobacco can be produced advantageously in the Purchase for a considerable number of years. The barns and equipment are suited to its production and many soils in the section are especially adapted to the growth of a high-quality product. Most farmers have had long experience in handling the crop and know how to grow it better than they know how to do anything else.

This situation has given rise to a number of perplexing questions. Among these are the following: Should the tobacco acreage be decreased still further, or should it be increased? What crops and livestock are likely to prove most profitable? On a given farm what is a good proportion between the cash crops

[4] This association has been the chief agency in the development of commercial strawberry growing in the Purchase Region. Following are the number of carlot shipments made in recent years; 1924, 101 cars; 1925, 121 cars; 1926, 217 cars; 1927, 361 cars.

and feed crops? What kinds of feed and how many acres of feed crops are needed for the livestock? What crops and livestock fit together to best advantage? Farmers are answering these questions in different ways. Some have been successful in making adjustments to meet the changed situation and are getting good returns. Others, following systems and practices of former years, are making little progress.

NATURE OF THE STUDY

In view of the difficulties confronting the farmers of the Purchase an economic study of the agriculture of the region was begun in the spring of 1924 by the Department of Farm Economics of the Kentucky Agricultural Experiment Station and the Bureau of Agricultural Economics of the United States Department of Agriculture. This study was continued in 1925 and 1926. The purpose of the investigation was to determine what farmers are doing to meet the changed conditions and what they may do in order to meet them better. Much attention was given to the methods used by successful farmers and to the systems of farming which they are following. Costs and returns were studied for the crops and livestock that are proving profitable, and the possibilities of new crops and livestock were considered.

In this bulletin are presented, first, the returns obtained on farms studied; second, outstanding weaknesses in farm practices and cost of improvements; third, production requirements, production and prices for crop and livestock enterprises; fourth, the nature of these enterprises and advantages and disadvantages of combining them. In Kentucky Experiment Station Bulletin 292, "Systems of Farming for the Purchase Region of Kentucky," are presented the results of combining various units of these enterprises into systems of farming for different sizes of farms.

For the most part the route or accounting method of obtaining data was used. Farmers of a carefully selected group were visited at regular intervals and assisted in keeping a complete record of all farming operations. Considerable investigation was done preliminary to the actual work of gathering the data

and during the period covered by the study about twelve hundred persons were interviewed. Additional data were obtained from many other sources. The data obtained include the following:

Farm returns: Records were obtained showing the number of acres operated, the number of men on the farm, acres in crops, number of livestock, crop yields, livestock production, farm expenses and farm receipts, including the value of products used in the home. Fifty of these records were obtained in 1924, 200 in 1925 and 50 in 1926.

Requirements for producing crops and livestock: Detailed records were obtained showing the amounts of man labor, horse work, seeds, fertilizer and other materials used in producing each of the crops, and the amounts of feed, pasturage, man labor, horse work and other materials used for each class of livestock. These data were obtained from 19 farms in 1924, 12 in 1925 and 14 in 1926. Additional records showing similar requirements for various crops and livestock were obtained, 9 of these being for sweetpotatoes, 11 for alfalfa, 9 for cotton, 19 for wheat, 6 for peaches, 8 for sheep, 54 for dairy cattle and 5 for poultry.

Yields of crops and production of livestock: Data have been brought together showing the crop yields that have been obtained in the section in recent years. The results obtained on the Lone Oak and Mayfield Soil Experiment Fields and other experimental data on crop and livestock production applicable to conditions in the section have been carefully reviewed. These data show the crop yields resulting from different fertilizer treatments and practices, and the livestock production resulting from different feeding practices.

Prices for expense items: Data were obtained showing the prices paid from 1921 to 1927 for feeds, seeds, fertilizers and other materials bought, and the rates paid for labor hired. These data were obtained from representative feed, seed and fertilizer stores in the section and the market reports of the United States Department of Agriculture.

Prices for products sold: Data were obtained showing the prices received in recent years for tobacco, wheat, strawberries,

milk, butterfat, hogs, eggs, poultry and other products. The data were obtained from local cooperative associations, private trade organizations and market reports and price studies of the United States Department of Agriculture.

RETURNS FROM FARMS STUDIED

The average net returns obtained on 20 farms in 1924, 1925 and 1926 are shown in Table 1. On these farms records were kept during each of the years included in the study. The items shown are the averages for the three-year period. The average net returns ranged from $290 to $1664. While these farms differ in size, quality of land and other resources, the differences in returns were due largely to things other than the number of acres farmed and the amount invested. For example, the average net return from farm 4 with 160 acres and an investment of $9049, was $290, while the average net return from farm 17 with 159 acres and an investment of $8,188 was $1,536.

TABLE 1. Receipts, Expenses and Net Returns from 20 Purchase Farms. Average 1924-26, Inclusive.

Farm No.	Acres	Business Investment[1]	Farm Receipts	Farm Expenses	Products Used in Home	Net Return[2]
24	177	$5,531	$1,894	$849	$618	$1,664
17	159	8,188	1,857	731	410	1,536
21	145	6,810	2,423	1,119	222	1,525
23	128	6,307	2,609	1,481	357	1,485
10	145	10,164	2,078	1,092	387	1,373
25	129	6,209	1,666	781	456	1,340
18	223	13,639	1,895	989	434	1,340
5	94	4,708	1,535	585	385	1,335
6	103	4,834	1,552	541	267	1,278
26	85	5,279	1,470	448	215	1,237
16	133	6,438	1,516	648	317	1,185
11	163	7,707	1,289	705	492	1,076
7	116	8,474	1,163	485	373	1,051
27	80	3,813	1,090	423	343	1,010
2	97	6,639	1,439	857	362	944
28	110	6,139	1,160	550	250	860
13	138	7,719	1,166	704	362	824
29	158	5,095	851	515	436	772
30	86	3,174	771	539	385	617
4	160	9,049	902	898	286	290
Av.	131	6,796	1,516	747	368	1,137

[1]Includes all farm property except the residence.

[2] Net return is the difference between farm receipts and farm expenses, plus the value of products used in the home. A decrease in the value of buildings, livestock, feeds and supplies or other farm property is considered as an expense, an increase a receipt.

There was a marked relation between net returns and farm receipts. In general the returns were largest on farms that had most to sell, and sales were largest on the farms that had two or more important sources of income. A common fault with most of the systems of farming that are now being followed is that they do not produce a large enough volume of products for the market. On many farms low returns were due to a poor combination of enterprises and uneconomical practices in conducting enterprises.

The favorable returns obtained on farm 24 were due largely to a good combination of cash crops and feed crops. Some fruit and truck crops were grown along with tobacco. Each year approximately one-third of the total crop acreage consisted of legumes. On farms 17 and 21 the high returns were due largely to good combinations of crops and livestock and good practices in feeding dairy cattle and hogs. Tobacco, dairy products and hogs were major sources of income and poultry and wheat minor sources on farm 17. On farm 21 dairy cattle and hogs were major sources of income and poultry and cotton minor sources. Tobacco was also an important source of income one year and sheep the other two years. Lime and phosphate were used and legume hay crops were grown on both farms. Enough legume hay was produced to furnish an important part of the ration for the cows in each case. Corn and soybeans were hogged down on both farms. Especially good pastures were provided on farm 21. On farm 23 the favorable returns were due largely to a good combination of cash and feed crops and good practices in the production of tobacco and feed crops. Tobacco, dairy products and poultry products were major sources of income and hogs, sheep and small grain minor sources. Lime and phosphate were used in a six-year rotation including mixed clovers for hay and pasture. A comparatively small acreage of tobacco was grown and good yields of high-quality tobacco obtained. Unusually good practices were used in curing tobacco.

On farm 4 low returns were obtained largely because of a poor combination of crops and livestock. Not enough livestock were kept to utilize the feeds grown. Poor practices in feeding

livestock and growing crops also contributed to the poor returns realized. Tobacco was carelessly handled in cutting and housing and poor methods used in curing. The labor was poorly managed and unnecessary expenses incurred for equipment. On farms 29 and 30 the returns were low largely because tobacco was the only important source of income. Few productive livestock were kept and no lime and only small amounts of phosphate were used.

UNPROFITABLE PRACTICES AND COST OF IMPROVEMENT

Low crop yields and poor pastures were found on most of the farms. Crop yields were low because of the impoverished condition of the soil resulting from faulty cropping systems and fertility practices. The pastures were especially poor in spring and mid-summer. This was the result of the impoverished condition of the soil, improper pasture mixtures and light seeding. Often no pasturage was available except a volunteer growth of Japan clover,[5] wild grasses and weeds.

The data obtained in this study indicate that the crop yields and pastures must be improved on most farms if satisfactory returns are to result. Livestock is an important source of income on many farms and the amount of livestock that can be profitably kept is limited by the amount of feed crops and pasturage. Little more man labor and horse work are used in preparing the land and cultivating an acre of crops with good yields than an acre with poor yields.

Crop yields: That good crop yields can be obtained in the Purchase has been shown conclusively by the results on the Lone Oak and Mayfield experiment fields during the past 13 years.[6] Similar results were obtained on many farms studied by the use of practices such as those used on these fields. These practices include desirable crop rotations and the use of limestone, phosphate, manure and legumes.

[5] Japan clover is the common name for lespedeza.

[6] These Experiment Fields are conducted by the Department of Agronomy of the Kentucky Agricultural Experiment Station. For a complete summary of results from 1913 to 1925 see Kentucky Experiment Station Bulletin 277.

By growing legumes in the rotations and applying ground limestone, superphosphate and manure or crop residues the following yields were obtained on the Lone Oak field: corn, average 13 crops, 41.3 bushels; soybean hay, average 9 crops, 3503 pounds; wheat, average 10 crops, 19.2 bushels; clover hay, average 7 crops, 3584 pounds. The following yields were obtained on the Mayfield field: corn, average 13 crops, 42.4 bushels; soybean hay, average 10 crops, 3603 pounds; wheat, average 11 crops, 17.2 bushels; clover hay, average 9 crops, 3371 pounds. About the same yields were obtained when rock phosphate was substituted for superphosphate in the treatment. Before treatment the crop yields on these fields were among the lowest in the communities in which they are located.

The rotation used was corn, soybeans, wheat and clover. Limestone was used at the rate of two tons per acre once in a rotation period (four years) for two rounds of the rotation, after which its use was discontinued. Superphosphate was used at the rate of 800 pounds per acre per rotation, or 200 pounds per acre per year for two rounds of the rotation after which 400 pounds per acre were used. At Mayfield, beginning with the fourth corn crop, manure was used at the rate of 6 tons per acre on corn for one round of the rotation, after which it was used at a rate equal to the weight of the crops removed in the previous rotation. At Lone Oak, beginning at the same time, manure was used at the rate of 6 tons per acre on corn for one round of the rotation, after which the cornstalks and wheat straw were returned. The second crop of clover was left on the ground on both fields.

The question arises as to whether yields approximating those indicated can be obtained economically. That is, will the value of the increased crop yields resulting from the treatments and rotations used be more than their cost? So many enterprises are affected that the determination of this involves a comparison of the returns normally to be expected from an entire farm with the practices and treatments and without them. Such comparisons are presented in another bulletin.[7] However, the work at

[7] See Kentucky Experiment Station Bulletin 292.

Lone Oak and Mayfield has been of such a nature as to show crop increases due to the use of limestone and phosphate. The results are reviewed and the approximate value of the crop increases and the cost of the treatment calculated. These are shown in Table 2.

The crop prices used are as follows: corn, 70 cents per bushel; soybean hay, field cured weight, $14 per ton; wheat, $1.30 per bushel, and clover hay, field cured weight, $14 per ton. One-fourth of the value of the crop increases is deducted to take care of added costs of harvesting the larger yields.

TABLE 2. Cost of Limestone and Superphosphate Treatment and Value of Crop Increases Resulting. (One Acre for Four Years, or Four Acres for One Year.)

Crop	Lone Oak Field		Mayfield Field	
	Amount	Value	Amount	Value
Corn @ 70c per bu.	5.8 bus.	$4.06	8.4 bus.	$5.88
Soybean hay @ $14 per ton	738 lbs.	5.17	1,037 lbs.	7.26
Wheat @ $1.30 per bu.	7.6 bus.	9.88	8.9 bus.	11.57
Clover hay @ $14 per ton	1,816 lbs.	12.71	2,469 lbs.	17.28
Total value increase		$31.82		$41.99
¼ off for harvesting increase		7.96		10.50
Value of increase above added harvesting costs		$23.86		$31.49
Limestone @ $3.25 per ton	1 ton	3.25	1 ton	3.25
Superphosphate @ $22 per ton	600 lbs.	6.60	600 lbs.	6.60
Total two above items		$9.85		$9.85
Value increase above harvesting, limestone and phosphate costs		$14.01		$21.64

It is assumed that two tons of limestone per acre in a four-year rotation for two rounds of the rotation will be sufficient for 4 rounds or 16 years. This amount will probably be sufficient for a longer period. The cost of superphosphate also is calculated on a 16-year basis. With 800 pounds per rotation for two rounds of the rotation and 400 pounds per rotation for two rounds, an average of 600 pounds per rotation is obtained. Obviously, if a longer period were taken, a smaller amount of superphosphate would be charged to each rotation.

The price used for superphosphate is $22 per ton, which is approximately the average price for ton lots at most points in the Purchase for the period from 1922 to 1926.[8] The price used for ground limestone is $3.25 per ton which is based on a price of $2.25 at the unloading point plus $1.00 per ton for hauling from the unloading point to the farm.[9] With these prices the cash outlay in each case is $9.85 per acre for one round of the rotation.

By subtracting these costs from the value of the crop increases, above the added harvesting costs, the amounts left are for applying one ton of limestone and 600 pounds of superphosphate. For the Lone Oak field this amount is $14.01, and for the Mayfield field $21.64. These added returns are for one acre of land for one round of the rotation or for four acres of land one year. The larger returns at Mayfield appear to be due largely to the fact that limestone and phosphate give better results when used with manure than when used with crop residues.[10]

Pastures: The pastures are being improved by the use of better pasture mixtures and heavier rates of seeding, and by the use of cover crops for early spring pasture. It has been found that the cheapest and most satisfactory way of producing good pastures in this region is to make them a part of the regular cropping program, and to provide for them when seeding the land for hay. On soils that have been treated with limestone

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[8] The prevailing prices for superphosphate in ton lots at Paducah were as follows: 1922, $17; 1923, $22; 1924, $21; 1925, $23; 1926, $23.

[9] At Mayfield the following prices have prevailed for ground limestone from 1922 to 1926: for winter delivery, $1.75 to $2.10 per ton; for summer delivery, $1.40 to $1.50 per ton. Fine ground limestone has been available at $2.25 per ton during the summer and fall of 1927. In 1927 a powdered limestone, of which 800 pounds will have about the same immediate effect as 2 tons of ordinary ground limestone has also been available at Mayfield and some other points in the Purchase at around $6 per ton.

If hired, the cost of hauling one ton 10 miles or less usually is $1 or less. For spreading one ton of limestone about one hour of man labor and two hours of horse work are required. For applying 600 pounds of superphosphate about two hours of man labor and four hours of horse work are required.

[10] The crop increases shown do not reflect all the benefits resulting from the use of lime and phosphate. The improvement in the fertility of the soil is an important factor. This is shown by the fact that the crop yields have been much larger during the later years of the trials than during the earlier years. For example, at Mayfield the average corn yields on the limestone, superphosphate and manured plots were 34.6 bushels from 1913 to 1916 and 54 bushels from 1922 to 1925.

and phosphate good results usually are obtained by sowing a small amount of a mixture of alfalfa, alsike clover and orchard grass along with the red clover that is to be cut for hay.[11] Such a mixture gives good pasturage for one or two years after the hay crop has been harvested. Where the soil has not been treated as above the problem of providing ample pasturage during all seasons of the year is much more difficult. On such soils the best results are being obtained by heavier seedings of the mixtures that are to be cut for hay, to which Japan clover seed have been added at the rate of about 8 to 10 pounds per acre.

Some farmers are getting good results by seeding directly for pasture. The kind of seed used, as well as the amount of pasture produced, depends largely upon the condition and fertility of the soil. On limed ground best results are obtained when the seeding contains one or more legumes. A mixture that has been found satisfactory in most places in the region is made up of Japan clover, sweet clover, orchard grass and redtop. The approximate cost of the seed for an acre seeded to a mixture of this kind is as follows:

Japan clover seed[12], 5 lbs. @ 12c	$0.60
Orchard grass seed[12], 5 lbs. @ 18c	.90
Redtop seed[12], 3 lbs. @ 20c	.60
Sweet clover seed[13], 4 lbs. @ 18c	.72
Total seed cost	$2.82

Unlimed soils will not support the growth of most of the common legumes, and mixtures seeded on them contain no such seed. Very good results have been obtained from the use of Japan clover, orchard grass and redtop.[14] The cost of this seeding is the same as that shown above, with sweet clover seed excluded .

[11] See page 349 for the rates and cost of seedling hay and pasture mixtures.

[12] Prices that have been paid in recent years for these seeds are shown as follows: Japan clover seed, page 344; orchard grass seed, page 349; redtop seed, page 352.

[13] Prices of sweet clover seed in this region usually range from 15 to 20 cents per pound.

[14] For a more detailed discussion of pastures see Kentucky Extension Circular 163.

Many farmers are getting late fall and early spring pastures by the use of rye and other cover crops. The approximate cost of seeding an acre of rye cover crop is as follows:

Cost of seed[15], 1½ bushels @ $1.40
Man labor, four hours
Horse work, ten hours

The man labor and horse work indicated include the time for preparing the seed bed after a cultivated crop and seeding the cover crop.

Pasture practices such as those discussed above make possible the handling of more livestock as well as the production of better livestock. They provide an abundance of cheap feed thruout the entire growing season. They help in balancing rations and in reducing the purchases of protein feeds. They help to maintain the fertility of the soil and thus make better crop yields possible.

A careful study of the results being obtained in the Purchase indicates that with any system of farming likely to give good returns the crop yields must be increased and better pastures provided. It has been demonstrated that these improvements can be made on most farms at comparatively small costs.

PRODUCTION REQUIREMENTS, PRODUCTION, PRICES AND RELATIONS BETWEEN ENTERPRISES

Along with the improvement in crop yields and pastures must come proper selection of crops and livestock. A comparison of the returns obtained from various enterprises shows that with good yields and practices some crops and livestock are more profitable than others.

In making comparisons of the net returns to be expected from crops and livestock it is imperative that adequate and reliable information as to crop and livestock requirements, yields, production and prices that may reasonably be expected shall be available. Such information is often not available and farmers

[15] Retail prices of rye per bushel prevailing at Paducah were as follows: 1921, $1.45; 1922, $1.25; 1923, $1.00; 1924, $1.20; 1925, $1.50; 1926, $1.25; 1927, $1.40.

often make comparisons of the relative net returns of enterprises on the basis of crop yields and livestock production of the preceding season, and the prices prevailing at or immediately before planting or breeding time. Such a basis is unsafe and is a frequent cause of loss.

Production requirements and production: Crop and livestock requirements, yields and production vary from year to year. In the case of crops the variations are due largely to the weather and to insects and diseases. The requirements may be low during a given year because of favorable weather during the planting, early growing and harvesting seasons. The yields may be high because of a favorable growing season. Insects and diseases destroy more of the crop during some years than others. In the case of livestock the requirements may be high and the production low because of a poor pasture season or unfavorable weather during the farrowing or lambing period. The converse of this also is true. Livestock diseases and parasites reduce the production more during some years than others.

For about twenty of the principal crop and livestock enterprises of the Purchase data are presented showing the actual requirements used and production obtained on farms studied. Data showing normal requirements and production are also presented. By normal is meant the requirements and production most likely to prevail under ordinary conditions. In presenting these data an effort is made to smooth out year-to-year variations and indicate requirements and production that appear probable considering a period of years. The reason for presenting them is to make easier comparisons of crop and livestock enterprises.

Prices: The prices of crops and livestock fluctuate from time to time. There are fairly regular seasonal price changes for both crops and livestock. For a product that may be marketed during the entire year generally the price is lowest during that part of the year when the largest quantities of the product go to market. For example, the price of corn usually is lower during the har-

vesting season than during the following summer and early fall. The prices of hogs tend to be lower during the late fall and early winter than during the late spring and summer. Dairy products usually are higher in price during the winter than during the summer months.

The prices of crops also change from year to year. Generally a large total production results in low prices and a small production makes for high prices. The prices of livestock tend to move in more or less definite cycles. For example, in addition to the seasonal change, hog prices tend to go up for from two to two and one-half years and then down for a similar length of time. The upward and downward price movements for most other classes of livestock are for longer periods. The most important influence in determining the length of these upward and downward movements is the nature of the breeding habits of the animal, or the length of time required to materially expand or contract production after unusually high or low prices are reached.

For the crops and livestock studied data are presented showing actual prices paid for expense items and prices received for products sold. Assumed relative prices for these items are also shown. These assumed relative prices are not intended as price predictions. They are presented primarily to emphasize the necessity for assigning values to the items to be bought and the products to be sold in deciding upon the possibilities of an enterprise. While these prices have been determined after a careful study of the prices that have prevailed in the section in recent years it will be necessary at any given time for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relations between enterprises: A thoro understanding of the nature of an enterprise and its tendency to compete with, supplement or complement the other enterprises of the section is essential to the proper determination of the possibilities of the

enterprise and its place in the system of farming.[16] Some of the competitive and supplementary relations may be observed by comparing the seasonal requirements of the various enterprises for man labor and horse work, and by noting the kinds and amounts of feeds used by different classes of livestock. Charts showing the seasonal requirements of man labor and horse work for the various enterprises are presented in the following pages along with the other enterprise data. The kinds and varying amounts of feeds used are shown in the tables of feeding requirements. No attempt is made to measure definitely the contribution that any enterprise makes to other enterprises. The nature of this contribution is mentioned in the discussion under each.

Corn

Corn is the principal feed crop of the Purchase. It requires large amounts of land and horse work and a small amount of man labor as compared with most other crops. The acreage of corn usually is larger than the acreage of all other crops combined and from two to three times as large as the combined acreage of all other cultivated crops. In recent years about one-fifth of the man labor and about one-half of the horse work used on farm enterprises in the Purchase have been devoted to corn.

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[16] Two enterprises compete if they use land, man labor or horse work at the same time or feeds of the same kind. Practically any crop or class of livestock competes in some way with several other crop and livestock enterprises but in some cases they compete to a greater extent than in others.

One enterprise is supplementary to another when it uses man labor or horse work at different times or feeds of different kinds or feeds of the same kind in varying amounts. Strawberries and tobacco are supplementary in that the largest labor requirements of strawberries are in May and early June and the largest labor requirements of tobacco are in August and September. Hogs and dairy cattle are supplementary in that hogs require a comparatively large amount of corn and dairy cattle a large amount of legume hay and rough feeds. Most classes of livestock are supplementary to most crops for the reason that the largest crop requirements are during the growing season and the largest livestock requirements during the winter months.

The relation is complementary when one enterprise contributes to the production of another. A dairy cow contributes to the production of both hogs and poultry in providing skim-milk with which to balance the grain rations. The dairy cow also contributes to crops in that manure is provided which may be used to increase crop yields. Legumes and pastures contribute to both livestock and crops in that they help balance the rations for the livestock and improve the crop yields.

Corn Harvested for Grain

Man labor, horse work and materials used for corn harvested from standing stalk: The man labor, horse work, seed and fertilizer used in producing corn when harvested from the standing stalk on the different farms during 1924, 1925 and 1926 are shown in Table 3. The averages expressed on the acre basis is shown in each case. The farms are arranged in the order of yield per acre, beginning with the highest. The hours of man labor and horse work used in harvesting are shown separately from those used prior to harvest.

The yields ranged from 13.1 to 35.8 bushels per acre. The chief factors influencing yields were the natural fertility of the soil, the fertilizer practices, the cropping system and the thoroness and timeliness of the tillage operations. On farm 14, the one with the largest average yield, most of the corn land has been limed in recent years. Superphosphate was used on each acre planted and a rotation including clover was followed. Dairy cattle were kept and the manure judiciously used. This is a rolling upland farm, typical of a large part of the Purchase, and ten years ago was below the average in productivity. On some of the farms with good yields, namely, farms 7, 6b and 13, most of the corn was grown on bottom land. On the fields of these farms on which the larger yields were obtained rotations including legumes were followed.

The man labor per acre used on corn ranged from 19.8 to 38.5 hours and the horse work from 33.4 to 61.1 hours. On two farms less than 33.4 hours of horse work were used but a tractor was used for some operations. The principal reasons for these differences were the timeliness and thoroness of the operations, size of the implement and number of horses used, size and shape of field, distance to the field and the character of the soil. On farm 14 on which a small amount of man labor and a moderate amount of horse work were used, the soil was thoroly prepared before planting. A three-horse section harrow was used when the corn was small, after which the crop received careful and timely attention with a two-horse cultivator. Little hand work with the hoe was necessary.

TABLE 3. Corn Harvested from Standing Stalk: Man Labor, Horse Work and Materials Used and Yields Obtained, Per Acre. Route Farms, 1924-26, Inclusive.

Farm No.	Av. Size of Crop	Yield	Man Labor			Horse Work			Seed	Superphosphate[4]
			Up to Harvest	Harvesting	Total	Up to Harvest	Harvesting	Total		
	Acres	Bus.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Lbs.	Lbs.
14[2]	15.7	35.8	15.7	4.1	19.8	32.3	7.9	40.2	8.0	99.7
7[2]	31.1	31.2	25.0	7.5	32.5	40.6	7.5	48.1	7.4	.....
6b[1]	25.3	29.8	18.4	7.8	26.2	33.6	11.8	45.4	6.7	.....
13[3]	21.6	29.6	22.2	7.0	29.2	32.3	5.4	37.7	4.7	.....
17a[1]	8.0	29.4	17.9	4.5	22.4	28.9	5.5	34.4	5.7	18.8
						.5[5]		.5[5]		
19a[1]	9.2	27.9	24.3	7.8	32.1	34.3	7.8	42.1	4.5	75.7
15[1]	9.8	27.0	27.2	4.3	31.5	42.0	7.2	49.2	5.7	.....
2[2]	19.5	26.7	24.4	6.2	30.6	37.6	4.5	42.1	6.5	.....
6a[2]	17.5	26.7	24.8	4.2	29.0	40.4	6.5	46.9	5.6	27.1
						3.9[5]		3.9[5]		
4a[3]	18.4	26.3	14.2	8.9	23.1	14.3	7.5	21.8	6.9	46.0
						.2[5]		.2[5]		
8a[3]	14.8	26.0	28.9	6.6	35.5	49.7	7.2	56.9	5.4	73.3
23[1]	14.4	25.8	16.2	4.3	20.5	28.1	5.3	33.4	9.7	6.9
12[1]	11.7	25.2	35.0	3.5	38.5	53.6	3.2	56.8	7.2	42.8
21[1]	34.8	24.8	19.9	5.3	25.2	37.7	5.5	43.2	8.1	.....
17b[3]	35.8	24.4	20.1	5.0	25.1	35.0	8.8	43.8	6.6	.....
16a[1]	21.0	24.3	30.9	6.5	37.4	50.0	9.1	59.1	6.7	19.0
8b[1]	14.3	24.0	19.8	6.1	25.9	36.8	7.1	43.9	5.9	.....
5[3]	25.2	24.0	23.2	7.4	30.6	40.4	10.2	50.6	7.6	.....
3[1]	24.3	23.6	22.5	5.5	28.0	32.5	5.3	37.8	5.8	.....
11[2]	22.4	22.1	29.0	4.7	33.7	51.1	4.5	55.6	11.1	.....
						4.7[5]		4.7[5]		
4b[2]	12.4	21.8	18.4	7.5	25.9	17.0	4.4	21.4	7.9	.....
1[1]	10.0	21.1	27.1	6.3	33.4	51.1	10.0	61.1	11.2	.....
10[1]	35.8	20.2	20.4	3.0	23.4	37.9	6.1	44.0	6.3	.....
16b[2]	26.4	19.0	22.7	5.8	28.5	41.8	7.9	49.7	7.0	.....
18[2]	11.9	18.6	26.5	5.6	32.1	47.0	6.3	53.3	6.5	.....
						.9[5]		.9[5]		
19b[3]	29.4	17.3	27.0	7.1	34.1	37.0	7.5	44.5	6.7	.....
9[1]	14.9	16.4	25.7	9.0	34.7	46.8	12.0	58.8	5.6	.....
22[1]	16.9	13.1	17.5	3.3	20.8	36.2	5.3	41.5	6.6	.....
						.4[5]		.4[5]		
Av.	21.1	24.6	22.7	6.1	28.8	36.7	7.2	43.9	7.0	

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Records for farms on which fertilizer was applied to only a part of the crop are designated by "a" and "b." The "a" part was treated, "b" untreated. [5] Tractor. The hours are above the horse hours for farms using tractors.

On farm 12 on which the largest amount of man labor and a comparatively large amount of horse work were used an important factor was the lack of timeliness in the major operations.

The land was prepared and the corn planted unusually early. As a result a poor stand was obtained and it was necessary to re-disk some of the land and plant a second time. The remainder of the corn grew slowly so that thoro cultivation with the plow was difficult and as a result a large amount of work with the hoe was necessary. The exclusive use of a one-horse drill in planting and a one-horse plow in cultivating was another important factor in determining man labor requirements.

The principal causes of the variations in the amounts of labor used in harvesting corn were the distance from the field to the barn, the size of the wagon box and the effectiveness of the worker. On farms 14, 17a and 15 large yields were harvested with small amounts of man labor and horse work, largely because of the use of wagon boxes of good size and effective work.

Superphosphate was used on some of the corn on nine of the farms. Farm 14 is the only one on which phosphate was used on all of the corn planted each year. In some cases where superphosphate was used for only a part of a field, it was not possible to get the yields and requirements separate for this part of the crop. In such cases the average yields and requirements for the entire field are shown. This accounts for the small phosphate applications shown for some farms. On all farms, except one, the yield was larger for the treated than for the untreated part.

Normal production requirements for corn harvested for grain: The data shown above as to requirements and yields have been used in connection with experimental data showing the results obtained from different fertilizer treatments and other data showing the yields of corn that have been obtained in the section in recent years in working out normal production requirements and yields for corn in the Purchase Region. These normal requirements are shown in Table 4.

The data shown in Table 3 have been used in determining the man labor, horse work and seed requirements for corn. The experimental data have been drawn upon in reaching conclusions as to a good fertilizer practice and a yield that may reasonably be expected. These data indicate that if corn is grown in a rota-

tion including legumes, and limestone and superphosphate are used, a 35-bushel yield is a conservative expectation. The yields being obtained on farms using limestone or superphosphate or a rotation including legumes or a combination of these tend to support this conclusion. Of the farms keeping detailed records an average yield slightly larger than 35 bushels was obtained on the only farm on which fertilizer and rotation practices similar to those indicated were consistently followed. The comparatively light application of fertilizer noted for this farm is due to the fact that superphosphate was also used on other crops in the rotation. Yields of 35 bushels or more were obtained on several other farms included in the study but for which less complete data were obtained. Generally practices similar to those mentioned above were followed on these farms.

TABLE 4. Corn Harvested from Standing Stalk: Normal Production Requirements and Assumed Relative Prices.
(Acre basis, 35-bushel yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements[2]:		Dolls.
Man labor, hrs.	27	[3]
Horse work, hrs.	42	[3]
Seed, lbs.	7	[3]
Superphosphate, lbs.[4]	400	1.10[5]
Equipment expense, cents[6]	75	
Production[7]:		
Grain, bus.	35	[8]

[1] For an explanation of this term see page 324. [2] For corn cut and shocked the requirements are as follows: Man labor, 40 hrs.; horse work, 40 hrs.; seed, 7 lbs.; superphosphate, 400 lbs.; twine, 2 lbs.; equipment, 75 cents. [3] Furnished by farm. [4] Usually two-thirds or more of the fertilizing value of the application is left in the soil for use by other crops. The amount shown is for one round of a rotation in which four crops are removed. Most profitable returns from the use of superphosphate are obtained on limed soil. The limestone is applied at the time the land is seeded to small grain and mixed clover hay. [5] Price per 100 lbs. [6] Includes depreciation, repairs and insurance on equipment but does not include interest and taxes. [7] For corn cut and shocked the production of stover is 2,300 lbs. [8] Used for feed.

The records kept on the farms indicate that under usual conditions in the section, about 20 hours of man labor and 35 hours of horse work are required prior to harvest in growing an

acre of corn yielding 35 bushels. In addition about 7 hours of man labor and 7 hours of horse work are required when it is harvested from the standing stalk, or 20 hours of man labor and 5 hours of horse work when it is cut and shocked and husked from the shock. This latter includes hauling the grain to the barn but does not include hauling the stover. This gives the totals of 27 hours of man labor and 42 hours of horse work when corn is harvested from the standing stalk, or 40 hours of man labor and 40 hours of horse work when cut and shocked.

Relation between corn harvested for grain and other enterprises: The seasonal distribution of man labor and horse work on corn when harvested from the standing stalk under usual conditions in the section is shown in Figure 2. The approximate

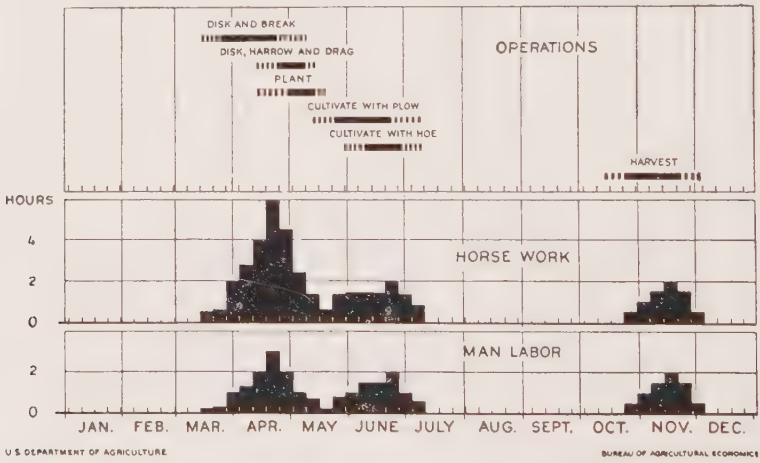

Fig. 2. Corn harvested from standing stalk: Seasonal distribution of man labor and horse work and periods of important operations. The solid lines in the top part of the chart represent the periods when most farmers perform the operations indicated. The dotted portions show the periods when the operations may be performed. The lower and the middle sections of the chart show the hours of man labor and horse work required at different seasons of the year, under usual conditions, for one acre of the crop.

beginning and ending dates for each of the principal operations are also indicated. The heaviest requirements for corn are in preparing the land and planting in April and early May, in cultivating in June and in harvesting in November. If corn is cut

and shocked and husked from the shock additional man labor is required in September, about 7 hours per acre being required for cutting. Approximately 6 hours more man labor and 2 hours less horse work are required for husking and hauling than for snapping and hauling. However, the husking usually may be done slightly later in the season than snapping. When corn is hogged down the only requirements after cultivation are small amounts of man labor and horse work in providing temporary fences.

Corn fits in well with the other crops and the livestock commonly handled in the Purchase. The preparation of the seed bed and planting follows the strawberry planting season and precedes the tobacco planting and strawberry harvesting seasons. The heavy part of the cultivation on corn comes after tobacco and sweetpotatoes are planted but before the worming and topping season for tobacco. Corn usually is harvested after tobacco is in the barn and before the tobacco stripping season. In addition to grain it makes available stover which aids in the economical feeding of horses, cattle and sheep While wheat or rye do not yield so well after corn as after tobacco or soybeans a good yield can be obtained if limestone and superphosphate are used.

It is probable that corn will remain the principal grain crop of the Purchase for some years. When included in a rotation with legumes, and limestone and superphosphate are used, generally the growing of corn is the most economical way of providing grain for feed. However, the advantages of corn are not such that it can be grown profitably as a cash crop on many farms. Consequently, in growing corn the problem of deciding upon the acreage to be included along with the other crops and the livestock is important. If economical rations are to be fed most kinds of livestock, corn must be used along with home-grown protein feeds and roughages and good pastures.

If some limestone and superphosphate were used on most farms and a larger acreage of legumes planted, as many bushels of corn as are being obtained at present could be obtained on a

greatly reduced acreage, thereby making it possible to devote much of the land, man labor and horse work now used for corn to legumes and thus provide better rations for livestock. Such practices are essential to the largest profits in any system of farming in which corn is included as one of the principal crops.

Corn Silage

On 5 farms silos were filled one or more years during the study. The man labor and horse work and power costs used in filling these silos are shown in Table 5. The requirements prior to filling were approximately the same as those shown for corn prior to harvest in Table 3. The only significant difference is that corn for silage usually is planted later and consequently the cultivation extends later into the season.

TABLE 5. Corn Silage: Man Labor, Horse Work and Tractor Work Used in Filling Silos and Yields Obtained, Per Acre. Route Farms, 1924-26, Inclusive.

Farm No.	Size of Crop	Yield	Man Labor	Horse Work	Tractor Work	
	Acres	Tons	Hrs.	Hrs.	Hrs.	Dolls.[4]
23[1]	5.2	6.0	29.1	28.3	2.02	4.04
10[1]	6.6	5.7	21.4	12.7	1.21	1.81
17[3]	5.0	5.6	27.7	18.3	1.48	2.46
2[2]	4.3	5.3	24.5	21.0	.91	1.37
19[2]	7.6	4.3	31.1	13.9	1.21	[5]
Av.	5.6	5.2	27.5	17.7	1.30	2.12

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Dollars shown cover the cost of hire of tractor and one man for the number of hours used. [5] Tractor owned.

The yields ranged from 4.3 to 6.0 tons per acre. The hours of man labor used per acre in filling silos ranged from 21.4 to 31.1 and the hours of horse work from 21.7 to 28.3. The principal reasons for differences in the amounts of man labor and horse work used were size of crew and the way it was managed, size and condition of the equipment and distance from the silo to the field.

Normal production requirements for corn silage: Normal man labor, horse work, seed, fertilizer and other costs for an acre

of corn silage are shown in Table 6. A normal yield of 7 tons per acre is shown. Land that will produce 35 bushels of corn generally will produce 7 tons of silage.

TABLE 6. Corn Silage: Normal Production Requirements and Assumed Relative Prices.
(Acre basis, 7-ton yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Dolls.
Man labor, hrs.	48	[2]
Horse work, hrs.	52	[2]
Seed, lbs.	10	[2]
Superphosphate, lbs.[3]	400	1.10[4]
Filling costs, dolls.[5]	2.25	.....
Building expense (silo), dolls.[6]	2	.....
Equipment expense, dolls.[7]	1.40	.....
Production, tons	7	[8]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 4, Table 4. [4] Price per 100 lbs. [5] Contract charge for engine and one man. [6] Depreciation, repairs and insurance when 50-ton wood silos are used. [7] See footnote 6, Table 4. [8] Used for feed.

The man labor and horse work requirements for an acre of silage corn are divided as follows: 20 hours of man labor and 35 hours of horse work prior to harvest and 28 hours of man labor and 17 hours of horse work in filling the silo, making a total of 48 hours of man labor and 52 hours of horse work. Usually the charge for an engine and one man for filling a silo is about $2.25 for an acre yielding 7 tons. The item for equipment expense includes depreciation, repair and insurance on equipment used in growing corn and filling the silo. It does not include interest and taxes.

Relation between corn silage and other enterprises: The seasonal distribution of man labor and horse work for corn silage is shown in Figure 3. The approximate beginning and ending dates for each of the principal operations are also indicated. Silage corn is usually planted and cultivated later than corn harvested in other ways. This is a point in favor of silage corn if a large acreage of other corn is planted. A comparatively

large acreage of corn often means that some of the corn will not fully mature and the late planting may be used for silage. Silo filling usually follows the cutting and housing season for tobacco.

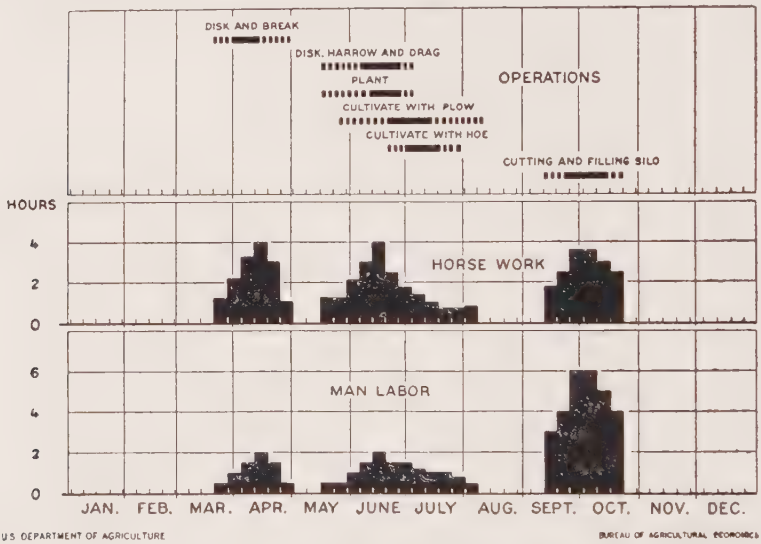

Fig. 3. Corn silage: Seasonal distribution of man labor and horse work and periods of important operations. (See explanation under Fig. 2.)

Since silo filling requires a large amount of man labor and horse work silage is a comparatively expensive feed if there are other crops that need attention at this time or if hired labor is necessary. On the other hand, if one can arrange the labor program so that there is no other pressing work to be done at silo filling time and is able to exchange work with his neighbors and is in a community with good equipment and effective workers the cost of corn silage may be considerably reduced.

Slightly less land is needed for growing feed crops for a given number of cows when silage is used than when they are fed with other feeds. Silage usually displaces more roughage than concentrates in the ration. Corn silage is best adapted to dairy farms having comparatively large amounts of land suitable for growing corn and so situated that the silo can be filled economically.

Sorghum

Sorghum is grown for molasses and for feed, about three-fifths of the total acreage being used for molasses. Sorghum has never been one of the more important crops and the acreage is decreasing each year. Only about one-half as much was produced in 1924 as in 1909. However, a small acreage of sorghum is grown on a large number of farms.

When produced for feed sorghum is usually handled in one of three ways: it is cut and fed green as a soiling crop, put into the silo, or cut and shocked for fodder. The requirements up to harvest are approximately the same for sorghum as for corn (See Table 3). The requirements per ton for cutting and putting into the silo are approximately the same as for corn silage. Usually about twenty hours of man labor per acre are required to cut and shock sorghum.

Normal production requirements for sorghum molasses, and assumed relative prices: Normal man labor, horse work, seed and other requirements for sorghum when made into molasses and assumed relative prices for molasses are shown in Table 7. The results obtained on the farm studied indicate that 60 gallons of marketable molasses is a conservative expectation when the cane is grown on reasonably good land and good prac-

TABLE 7. Sorghum Molasses: Normal Production Requirements and Assumed Relative Prices.
(Acre basis, 60-gallon yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Cents
Man labor, hrs.	120	[2]
Horse work, hrs.	90	[2]
Seed, lbs.	6	[2]
Wood, loads	1	[2]
Equipment expense, dolls.[3]	1.25	.....
Production, gals.	60	75

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 6, Table 4.

tices followed in cultivation and evaporating. In growing sorghum for molasses it is necessary to select the land carefully if a choice product is to be obtained.

Under usual conditions about 20 hours of man labor and 35 hours of horse work are used prior to harvest, approximately 50 hours of man labor in stripping, heading and cutting and 50 man hours and 55 horse hours in hauling to the mill, grinding and evaporating. In addition to the above, usually one-fourth of the production is given as toll to pay for the use of grinding and evaporating equipment and the services of one man in evaporating. One load of wood is required for the evaporating per acre.

The prices that have prevailed for molasses in recent years have been such as to result in low returns for the land, man labor, horse work and materials used in its production. Generally for most farms there are other enterprises that offer better opportunity for profits than molasses when produced on a commercial basis. However, on those farms that have a surplus of labor in September and October during molasses making time it will usually be advisable to produce enough for home use and perhaps in some cases a small surplus for sale.

Soybeans

The acreage of soybeans has increased rapidly in recent years. However, on the farms keeping detailed records in this study in 1924 only about one acre of soybeans was grown to seven acres of corn; in 1926 about two acres of soybeans were grown to seven acres of corn. Considering all farms in the Purchase, in 1924 about 25 times as many acres of corn as of soybeans were grown.

Soybeans are used chiefly as a feed for dairy cattle and are practically the only source of legume hay on many farms. They are also grown on a few farms for seed. When soybeans are grown for hay the man labor and horse work requirements are about the same as the requirements for corn prior to harvest. That is, the requirements in preparing the land and planting corn and soybeans are about the same and the requirements for

cultivating corn about the same as those for harvesting soybean hay. The man labor and horse work requirements are somewhat heavier when soybeans are harvested for seed.

Man labor, horse work and seed used for soybean hay: The man labor, horse work, and seed used in the production of soybean hay are shown in Table 8. On the farms for which de-

TABLE 8. Soybean Hay: Man Labor, Horse Work, Seed and Fertilizer Used and Yields Obtained, Per Acre. Route farms, 1924-26, Inclusive.

Farm No.	Size of Crop	Yield	Man Labor			Horse Work			Seed	Superphosphate
			Up to Harvest	Harvesting	Total	Up to Harvest	Harvesting	Total		
	Acres	Lbs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Hrs.	Bus.	Lbs.
21[1]	14.1	3,603	9.7	14.4	24.1	19.5	17.2	36.7	1.3	———
14[2]	8.0	3,174	10.7	10.6	21.3	22.5	9.6	32.1	.5	
8[3]	8.7	2,281	16.5	11.4	27.9	33.3	15.3	48.6	.4	
22[1]	11.7	2,269	13.1	9.0	22.1	27.5	11.4	38.9	.6	
17[3]	6.4	2,239	13.1	8.8	21.9	26.7	10.9	37.6	.4	5.0
23[1]	10.9	2,210	10.4	5.8	16.2	20.7	9.9	30.6	.9	103.6[4]
						1.3[5]		4.3[5]		
4[3]	4.2	1,900	9.8	9.9	19.7	10.0	12.3	22.3	.7	11.7
13[2]	1.7	1,724	13.6	5.3	18.9	24.3	6.3	30.6	.4	
2[2]	4.8	1,710	20.4	6.6	27.0	29.3	7.2	36.5	.3	
5[3]	1.9	1,693	18.5	24.2	42.7	29.9	30.1	60.0	.4	
10[1]	7.2	1,660	7.8	8.4	16.2	16.6	11.2	27.8	.4	
16[2]	4.2	1,504	12.0	11.8	23.8	28.6	16.6	45.2	.3	
15[1]	12.0	1,479	8.4	4.8	13.2	22.1	6.8	28.9	.4	
11[2]	3.9	1,410	19.0	9.4	28.4	47.8	12.6	60.4	.5	
6[2]	3.9	1,252	15.0	5.4	20.4	30.7	9.0	39.7	.6	
18[1]	7.6	1,127	12.7	4.6	17.3	21.9	6.0	27.9	.4	
						.3[5]		.3[5]		
19[2]	2.1	1,090	14.9	5.7	20.6	28.2	7.3	35.5	.5	———
						.4[5]		.4[5]		
Av.	5.8	2,053	13.2	9.5	22.7	25.6	12.0	37.6	.6	

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] In addition 405 lbs. tobacco stalks were used. [5] Tractor. The hours are above the horse hours for farms using tractors.

tailed data were obtained for two or more years, the yields ranged from 1089.6 pounds per acre to 3173.6 pounds. On one farm for which data are available for only one year a yield of 3603.4 pounds was obtained. The amounts of man labor used per acre ranged from 13.2 to 42.7 hours and the horse work from 27.8 to 60.4 hours. On one farm less than 27.8 hours of horse work were used but a tractor was also used for some operations.

On farm 21 on which a yield of 3603.4 pounds was obtained the soybeans were grown on thin unlimed upland soil. This soil was thoroly inoculated and 1.3 bushels of Mammoth Yellow seed sown per acre. The seed bed was thoroly prepared and a good stand obtained. No cultivation was necessary since the beans were thick enough to keep down the weeds. Only 9.7 hours of man labor and 19.5 hours of horse work were used prior to harvest. This crop was cut in the usual way, raked to the baler with a sweep-rake, baled and hauled to the barn. Including the labor for baling, 14.4 hours of man labor and 17.2 hours of horse work were used in harvesting.

On farm 14, on which an average yield of 3173.6 pounds was obtained during the two years for which data were available, soybeans were grown on unlimed, upland soil following cultivated crops. The seed bed was thoroly prepared each year. One crop was planted in rows and cultivated and the other was sown broadcast and not cultivated. One peck of seed was used per acre for the cultivated crop and 6 pecks per acre for the crop sown broadcast. Prior to harvest, 11.1 hours of man labor and 21.1 hours of horse work were used per acre on the cultivated crop and 9.6 hours of man labor and 23.6 hours of horse work on the uncultivated crop. Both crops were cut, raked and hauled to the barn, 10.6 hours of man labor and 9.6 hours of horse work being used, on the average, for these operations.

Good yields were obtained both years but the quality of the uncultivated crop was better than that of the cultivated crop even tho it was planted later and at a less desirable time. This farmer after considering the results obtained each year and the conditions under which each crop was grown planted the following crop with a wheat drill using a heavy rate of seeding.

Prices of soybean seed: The prices paid by farmers for different varieties of soybean seed are shown in Table 9. The average Kentucky farm prices for soybeans in small lots are also shown. The high price for Laredoes in 1925 was due to the fact that this variety was just being introduced that year and at the time was not handled in quantities by local merchants.

TABLE 9. Soybean Seed: Prices Per Bushel Paid by Farmers, 1922 to 1927.

Year	Prices Paid by Farmers				Kentucky Farm Price
	Mammoth Yellow	Haberlandt	Virginia	Laredo	
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1922	2.50	2.50	[1]	[1]	2.30
1923	2.75	3.25	4.00	[1]	2.67
1924	3.00	3.00	3.00	[1]	2.90
1925	3.25	3.00	3.00	3.00	3.18
1926	2.50	3.00	3.00	3.50	2.72
1927	1.50	3.00	3.00	2.50	2.33

[1] Data not available.

Normal production requirements for soybean hay, and assumed relative prices: Normal man labor, horse work, seed and other requirements for soybeans when they are harvested for hay are shown in Table 10. The results cited on the farm-plot and experimental tests from the Lone Oak and Mayfield fields indicate that a yield of 2,000 pounds of well cured hay is a reasonable expectation when 5 pecks of standard hay varieties are sown and reasonably good practices are used. The man labor and horse work shown represent requirements for broad-

TABLE 10. Soybean Hay: Normal Production Requirements and Assumed Relative Prices.

(Acre basis, 2,000-lb. yield.)

	Amount	Assumed Relative Price[2] Per Unit
Requirements:		
Man labor, hrs.	20	[3]
Horse work, hrs.	17	[3]
Inputs:		
Seed, bus.	1.25	2.40
Inoculation[4]	.....	.....
Equipment expense, cents[5]	75	[3]
Production, lbs.	2,000	[6]

[1] For an explanation of this term, see page 334. [2] Furnished by farm [illegible] for the rotation is applied on the previous cultivated crop at the rate of 100 lbs. for each crop removed in the rotation. [4] Inoculation will usually be obtained from a field that is known to be inoculated. If the field to be sown is already inoculated this operation will not be necessary. Commercial culture to inoculate a bushel will cost about 50 cents or less in quantities. [5] See footnote 5, Table 4. [6] Used for feed.

ing, disking, harrowing and dragging, seeding with a wheat drill, a small amount of cultivation, cutting, raking and hauling to the barn. Approximately 10 hours of man labor and 21 hours of horse work are required in preparing the seed bed and planting, one hour of man labor and 3 hours of horse work in cultivating and 9 hours of man labor and 11 hours of horse work in harvesting. From 2 to 3 hours more man labor and 2 to 3 hours more horse work are required when soybeans are planted in rows and cultivated. The rate of seeding when the crop is cultivated varies from one to two pecks.

Most of the soybeans grown have been planted in rows and cultivated. However, the results obtained on the few farms on which the beans have been sown broadcast indicate that the added yield and improved quality of hay are more than sufficient to pay for the additional seed.

Some of the land in the Purchase is already inoculated for soybeans. However, one should know definitely that the soil is inoculated before omitting this important operation. The lack of inoculation is a common cause of poor yields. The growing of soybeans with no inoculation present will impoverish rather than improve the fertility of the soil. Inoculation may usually be obtained from soil on which inoculated soybeans have been grown. If a commercial culture is used the amount needed to inoculate one bushel of seed usually will cost about 50 cents.

The price for soybean seed is for varieties of such size that 5 pecks will sow an acre, such as the Virginia or Lexington. If a smaller seeded variety is selected the price per bushel will usually be more but the rate of seeding less. The reverse will usually be true if a larger seeded variety is selected. In either case the cost per acre will be approximately the same. At any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between soybean hay and other enterprises: The seasonal distribution of man labor and horse work on soybean hay is shown in Figure 4. The approximate beginning and end-

ing dates for the principal operations are also indicated. The man labor and horse work requirements are heaviest in May and early June and September. Soybeans may be planted slightly later than corn. However, the seed bed preparation and planting compete directly with the same operations for tobacco and strawberry harvesting. The harvesting season for soybeans comes during the cutting and housing season for tobacco. While neither the planting nor harvesting are definitely fixed as to time both must be done during busy seasons on farms growing tobacco, and the planting must be done during an extremely busy season on farms growing strawberries. Because of the competition with other crops, the comparatively heavy man labor and horse work requirements and the high cost of seeding, soybean hay is generally regarded as an expensive crop. However, it has points in its favor that should be recognized.

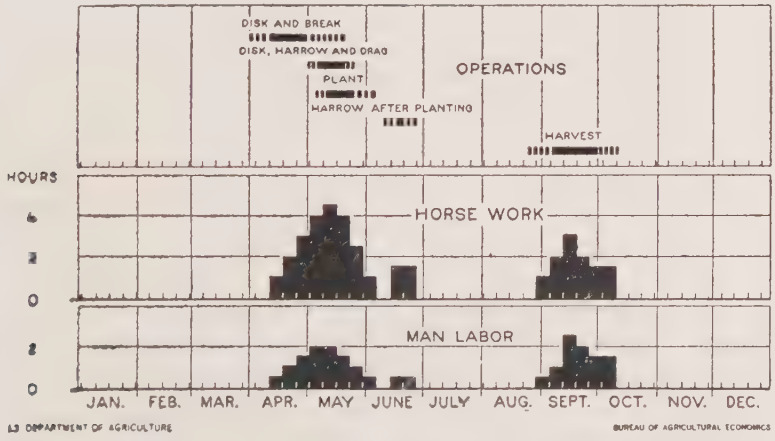

Fig. 4. Soybean hay: Seasonal distribution of man labor and horse work and periods of important operations. (See explanation under Fig. 2.)

Soybeans make valuable contributions to other crops and to livestock. If inoculated they gather nitrogen and aid in the improvement of the soil when fed and the manure returned. A seed bed for small grain may be easily prepared after soybeans and usually better yields are obtained than after corn. It is important that soybeans be followed by a cover crop which may

be pastured, harvested for hay or harvested for grain. Soybean hay is one of the best feeds for dairy cattle. It provides protein and roughage, both of which are important in the production of dairy products.

In the Purchase soybeans are best adapted to those farms on which alfalfa or mixed clovers are not being grown. On most unlimed soils Japan clover can be grown successfully where true clovers fail. On farms with such soils soybeans have a place as a supplementary hay crop until the land can be limed and true clovers or alfalfa grown for hay. Soybeans and Japan clover fit well together since the acreage of soybeans may be adjusted somewhat to the Japan clover prospects shortly before soybean planting time. On farms growing alfalfa or mixed clovers, if these crops fail or if more hay is needed than they provide, soybeans will usually be the most economical substitute. On farms with dairying a major enterprise, a small acreage of soybeans along with alfalfa or mixed clover may be advisable to distribute the labor requirements, eliminate some of the risk and give variety to the ration.

Japan Clover (*Lespedeza*)

Japan clover (Lespedeza) is the principal legume used for pasture in the Purchase. It is also an important source of hay on many farms. Its use as a hay crop has increased rapidly during the past 15 years but it is still used more generally for pasture than for hay. During the past 5 or 6 years the production of Japan clover seed has become an important side line on a few farms.

Man labor, horse work and seed used for Japan clover: The man labor and seed used in seeding Japan clover are shown in Table 11. The amounts of seed used ranged from 3.7 to 21 pounds per acre. On most farms a light rate of seeding, from 4 to 10 pounds, was used. Usually from 3 to 5 pounds of redtop were also sown. With a light rate of seeding, generally from one to two years were required before volunteer seedings were sufficient to provide a good hay crop, but during this time usually some pasturage was obtained. If a hay crop is expected

the first year, 25 pounds of seed or more are sown. Less than one hour of man labor per acre is usually used in seeding.

Japan clover is seeded in the spring, usually on small grain or on land that was in a cultivated crop the previous year and left bare thru the winter. On most farms if land is left idle and no seed are sown some volunteer Japan clover will grow the first year. On the more fertile land the growth usually will be sufficient by the second or third year to provide a crop of hay. When Japan clover is seeded or when a volunteer stand is obtained it is often left from 3 to 5 years.

TABLE 11. Japan Clover Hay: Man Labor, Horse Work and Seed Used and Yields Obtained, Per Acre. Route Farms, 1924-26, Inclusive.

Farm No.	Size of Crop	Yield	Harvesting		Seeding	
			Man Labor	Horse Work	Man Labor	Seed
	Acres	Lbs.	Hrs.	Hrs.	Hrs.	Lbs.
10[1]	3.2	3,861	11.4	20.9	.7	4.4
2[1]	4.8	3,026	5.4	7.2	.4	7.1
14[2]	6.9	2,660	4.9	9.7	.3	21.0
15[1]	12.4	2,550	7.8	10.2	.....	.....
19[1]	8.7	2,394	7.0	11.4	.6	3.7
9[1]	10.0	2,390	9.0	10.0	.9	9.6
3[1]	6.8	2,144	2.9	4.4	.8	5.5
21[1]	1.0	2,000	9.5	12.0	.....	.....
7[1]	5.4	1,657	11.0	14.2	.....	.....
6[1]	8.7	1,632	10.9	15.4	.5	20.0
8[2]	9.0	1,275	7.3	9.7	.4	5.3
18[1]	3.5	1,143	9.4	12.4	.....	.....
11[2]	11.9	1,090	5.4	7.7	.....	.....
13[1]	2.0	1,050	8.2	10.5	.....	.....
16[2]	2.2	999	8.8	13.7	1.0	18.5
5[2]	1.6	862	4.3	6.2	.4	5.6
22[1]	7.0	856	4.8	6.3	.3	10.7
1[1]	1.7	693	5.8	8.1	.....	.....
Av.	6.0	1,797	7.0	9.9	.6[3]	8.8[3]

[1] Records covering one year. [2] Records covering two years. [3] Average for acres seeded.

The man labor and horse work used in harvesting Japan clover hay are shown also, in Table 11. The highest yield was 3861 pounds and the lowest 856 pounds. Due to an unusually dry season no Japan clover hay was harvested on the farms studied during one of the three years. The man labor ranged

from 4.8 to 11.4 hours and the horse work from 6.3 to 20.9 hours. In harvesting the most common practice was to cut and rake to the baler and haul to the barn.

On farm 10, on which a yield of 3861 pounds was obtained, 11.4 hours of man labor and 20.9 hours of horse work were used, exclusive of baling. The baling was done on a contract basis. On farm 2, on which a yield of 3026 pounds was obtained, similar practices were followed and only 5.5 hours of man labor and 7.2 hours of horse work were used. Differences in the management of the crew, condition of the machinery and distance hauled were the chief causes of these differences in requirements. On farm 2 the crop was grown on a field adjacent to the barn and the equipment was in good condition. On farm 10 the crop was hauled about two miles and the equipment was in poor condition. More than twice as much man labor and horse work were used on farm 10 as on farm 2.

On farm 19, on which a yield of 2394 pounds was obtained, the crop was handled in the same way as on farms 2 and 10, and 7 hours of man labor and 11.4 hours of horse work were used. On farm 9, on which a yield of 2390 pounds was obtained, similar practices were followed and 9 hours of man labor and 10 hours of horse work were used in harvesting.

Prices of Japan clover seed: The prevailing prices paid by farmers for Japan clover seed from 1921 to 1927 are shown in Table 12. These were the prices paid for seed in lots of one bushel or more.

TABLE 12. Japan Clover Seed: Prices Per Pound Paid by Farmers, 1921 to 1927.

Year	Prices Paid at Paducah
	Cents
1921	26
1922	16
1923	18
1924	20
1925	18
1926	18
1927	9

Normal production requirements for Japan clover hay, and assumed relative prices: Normal man labor, horse work and seed requirements for Japan clover hay and the assumed relative price for seed are shown in Table 13. A normal yield of 2000 pounds is indicated. Eight pounds of seed are shown as a normal rate of seeding when a crop is to be harvested the second year. If a hay crop is expected the first year about three times this much seed should be sown. Three or more crops are often harvested from one seeding. Land suited for the production of Japan clover hay, and seeded may reasonably be expected to yield 2000 pounds per acre. It is expected that on most farms additional land not suited for the production of hay will be seeded to a Japan clover mixture and used for pasture.

TABLE 13. Japan Clover Hay: Normal Production Requirements and Assumed Relative Prices.
(Acre basis, 2000-lb. yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Cents
Man labor, hrs.	9	[2]
Horse work, hrs.	10	[2]
Superphosphate	[3]	.....
Seed, lbs.	8	12
Baling, contract, dolls.[4]	2.40	.....
Equipment expense, cents[5]	50	.....
Production, lbs.	2,000	[6]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 3, Table 10. [4] Includes cost of wire, power, equipment and crew, exclusive of hauling to and from baler. [5] See footnote 6, Table 4. [6] Used for feed.

The requirements include one hour of man labor for seeding and 8 hours of man labor and 10 hours of horse work for harvesting. The price indicated for seed is for good grade Kentucky grown seed. The usual contract charge for baling is $2.40 per ton. At any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between Japan clover hay and other enterprises: The seasonal distribution of man labor and horse work for seeding and harvesting Japan clover hay, together with the approximate beginning and ending dates for these operations are shown in Figure 5. The principal man labor and horse work requirements are for harvesting in September and early October. This operation usually follows the cutting and housing of tobacco but generally conflicts with tobacco curing, harvesting soybeans, cutting and shocking corn and seeding small grain. However, the harvesting of Japan clover is not definitely fixed as to time and may be done either before or after the more exacting operations. When produced for seed the harvesting is usually done about ten days later in the season than when produced for hay.

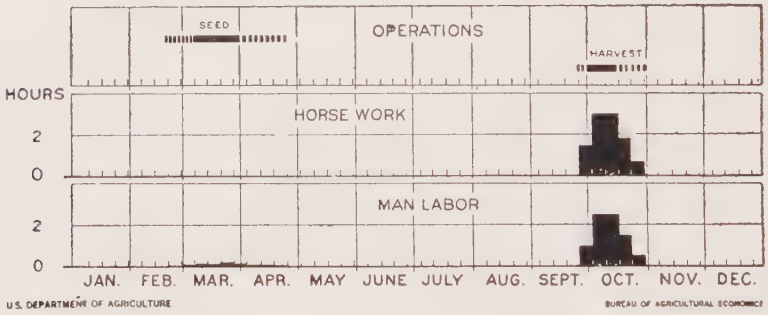

Fig. 5. Japan clover hay: Seasonal distribution of man labor and horse work and periods of important operations. (See explanation under Fig. 2.)

Japan clover is one of the best hay crops in the Purchase for unlimed land. As compared with soybeans it requires no attention during the busy season in the spring when the land for soybeans must be prepared and planted and it is less exacting and more easily handled in harvesting. However, since low yields or failures often result from unusually dry seasons it is generally not advisable to depend upon Japan clover as the only hay crop.

Mixed Clover Hay

In the early agriculture of the Purchase clovers for hay and pasture were grown quite generally. Later, due to the development of unfavorable soil conditions and other factors, fail-

ures became common. This and other influences caused many farmers to turn to other hay and pasture crops.

The increased attention being given to dairying has caused renewed interest in the production of clovers for hay and the improvement of rotation pastures. Thru the use of limestone, clovers are being successfully grown in every section of the Purchase. On a few farms fair stands of red and alsike clovers have been obtained without the use of lime.

Man labor, horse work and seed used for mixed clover hay: The man labor and seed used in seeding and the man labor and horse work used in harvesting mixed clover hay are shown in Table 14. The yields ranged from 1093 to 3964 pounds per

TABLE 14. Mixed Clover Hay: Man Labor, Horse Work and Seed Used and Yields Obtained, Per Acre. Route Farms, 1924-26, Inclusive.

Farm No.	Size of Crop	Yield	Harvesting		Seeding	
			Man Labor	Horse Work	Man Labor[4]	Seed
	Acres	Lbs.	Hrs.	Hrs.	Hrs.	Lbs.
22[1]	3.9	3,964	16.5	11.3	.8	14.1
12[1]	4.8	3,207	18.8	21.5	.6	12.5
21[1]	4.0	2,986	8.1	8.1	.9	14.6
3[1]	4.1	2,971	12.7	17.8	.....	.....
4[2]	4.2	2,360	9.8	11.4	.7	9.9
2[2]	1.7	1,934	9.3	10.5	.5	15.3
7[1]	3.9	1,928	8.6	11.3	.....	.....
5[1]	13.7	1,808	7.7	9.4	.....	.....
23[1]	8.0	1,283	7.4	9.3	.8	12.2
17[3]	6.7	1,093	5.5	7.7	.9	7.8
Av.	5.2	1,984	9.0	10.6	.8[5]	11.9[5]

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Two times over. [5] Average for acres seeded.

acre. The chief factors influencing yields were the kind and amount of seed sown, the amount of lime used, the rotation followed, and the natural fertility of the soil.

On farm 22, on which the largest average yield was obtained, limestone was applied at the time the land was prepared for to-

bacco. Timothy was sown in the fall followed by a heavy seeding of red clover in the spring. The crop was cut one year and then pastured. The hay crop on farm 12, the one with the next highest yield, was handled in practically the same way as that on farm 22. On farm 21, on which the third largest yield was obtained, the mixed hay followed a cultivated crop. The land was limed, the seed bed prepared late in March and a mixture of clover and alfalfa seeded. The crop was clipped and pastured lightly that year, and a hay crop harvested the following year.

On farm 17, on which the lowest yield was obtained, a very light seeding of mixed clovers was sown following corn and a poor stand resulted. The land had a fair application of limestone which was worked into the soil in preparing the seed bed. The data shown for this farm are the averages for three successive crops from one seeding.

The man labor per acre used in harvesting ranged from 5.5 to 18.8 hours and the horse work ranged from 7.7 to 21.5 hours. The chief causes of the wide variations in labor requirements were the yield obtained, the way in which the hay was handled and the distance to the barn. On farm 12, on which the man labor and horse work were highest, the hay was rained on after it was cut and raked and a large amount of extra work was used in scattering and re-raking. The crop was handled with inefficient machinery and hauled about one-half mile to the barn. The yield was second highest on this farm.

Farm 17 which had the lowest labor requirements also had the lowest average yield. All the hay on this farm was hauled to the barn loose and unloaded with the hay fork. The hay field was located near the barn.

The seed used varied from 7.8 to 15.3 pounds. Generally the heavier seedings resulted in larger yields. The three crops for which no seed is reported were sown before the records were started.

Seed prices: The prevailing prices paid by farmers for red clover, alsike, orchard grass and alfalfa seed in small lots are shown in Table 15.

TABLE 15. Mixed Clover Hay, Seeds: Prices Per Pound Paid by Farmers for Red Clover, Alsike, Orchard Grass, and Alfalfa, 1921 to 1927[1]

Year	Red Clover	Alsike	Orchard Grass	Alfalfa
	Cents	Cents	Cents	Cents
1921	22	25	15	23
1922	25	20	20	20
1923	22	20	18	20
1924	25	18	19	23
1925	35	25	18	25
1926	33	25	20	20
1927	40	38	18	25

[1] Farm-reported.

Normal production requirements for mixed clover hay, and assumed relative prices: Normal man labor, horse work, seed and other requirements for mixed clover hay and assumed relative prices for expense items are shown in Table 16. The results obtained on the farms studied and data from the Lone Oak and Mayfield experiment fields show that a yield of 2500 pounds is a reasonable expectation when the indicated seeding mixture is sown on limed and fertilized soil and reasonably good practices

TABLE 16. Mixed Clover Hay: Normal Production Requirements and Assumed Relative Prices.
(Acre Basis, 2500-lb. Yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Dolls.
Man labor, hrs.	11	[2]
Horse work, hrs.	12	[2]
Superphosphate	[3]	
Limestone, tons[4]	2	3.25
Seed, Red clover, lbs.	3	.30
Alsike, lbs.	1	.25
Alfalfa, lbs.	3	.23
Orchard grass, lbs.	5	.18
Inoculation[5]		
Equipment expense, cents[6]	60	
Production, lbs.	2,500	[7]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 4, Table 4. [4] Ground to pass 10-mesh sieve. The price shown includes $2.25 for stone at the station and $1.00 to cover cost of hauling to farm. The amount shown is for one round of the rotation. [5] Inoculation will usually be obtained from a field that is known to be inoculated. If the field to be sown is already inoculated this operation will not be necessary. [6] See footnote 6, Table 4. [7] Used for feed.

are followed. The man labor and horse work shown represent requirements for spreading lime, seeding, and harvesting hay.

Some of the land in the Purchase is already inoculated for red clover and alfalfa. However, it should be known definitely that the soil is inoculated before omitting this very important operation. The lack of thoro inoculation is a common cause of poor stands of clover and alfalfa. The inoculation may be obtained from soil on which inoculated crops have been grown. If commercial cultures are used the amount necessary to inoculate a bushel of seed will usually cost about 75 cents, or less if bought in larger quantities. The prices shown for limestone and seeds are about the same or slightly above the average prices that have prevailed for these items in the section from 1921 to 1927. However, at any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between mixed clover hay and other enterprises: The seasonal distribution of man labor and horse work in seeding and harvesting mixed hay, together with the approximate beginning and ending dates for these operations, are shown in Figure 6. Limestone for mixed clovers generally is applied prior to seeding small grain in the fall. The seed is usually

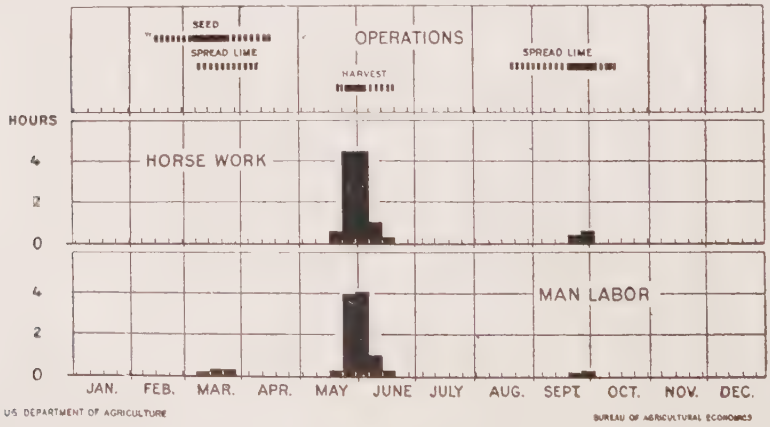

Fig. 6. Mixed clover hay: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

sown on small grain in February and March. Mixed hay is usually ready to cut the last week in May or early in June. Harvesting usually follows corn and tobacco planting but competes to some extent with the cultivation of these crops. It also competes directly with soybean planting, strawberry harvesting, and harvesting the first cutting of alfalfa hay.

Limestone may be hauled and mixed clovers seeded when other farm work is not pressing. There is only one period at which the crop competes with other enterprises for labor while with soybeans there are two periods that compete with rush seasons for other crops and with alfalfa there are four. After a crop of mixed clover hay has been harvested good pasturage usually can be obtained from the seeding for one or two years. The crop fits well into most cropping systems and enables the farmer to keep his land profitably occupied thruout the year.

Redtop Hay

Some redtop hay is harvested on a large proportion of the farms of the Purchase. It is used chiefly as a feed for work stock.

Man labor, horse work and seed used for redtop hay: The man labor and seed used in seeding and the man labor and horse work used in harvesting redtop hay are shown in Table 17. The yields ranged from 600 to 1431 pounds per acre. The chief factors influencing yields were the natural fertility of the soil, amount of seed sown, fertilizer practices and the rotation followed.

The average yield of redtop hay was only about half as large as the average yield of mixed clover hay. On those farms where both redtop and mixed clover hay were grown the average yield of redtop was 946 pounds per acre and the average of mixed clover hay was 1665 pounds per acre. The seed used ranged from 2.7 to 13.9 pounds per acre.

The man labor used per acre in harvesting ranged from 4.3 to 10.0 hours and the horse work from 5.2 to 12.9 hours. The differences were due largely to the difference in yield and the way in which the crop was handled. Weather conditions were a

TABLE 17. Redtop Hay: Man Labor, Horse Work and Seed Used and Yields Obtained, Per Acre. Route Farms, 1924-26, Inclusive.

Farm No.	Size of Crop	Yield	Harvesting		Seeding[4]	
			Man Labor	Horse Work	Man Labor	Seed
	Acres	Lbs.	Hrs.	Hrs.	Hrs.	Lbs.
4[2]	6.7	1,431	6.5	6.1	.6	6.8
2[2]	10.4	1,396	5.7	6.5	.4	5.4
10[1]	30.8	1,390	6.8	7.8	.3	5.1
19[2]	13.2	1,268	4.7	6.9	.....	.....
1[1]	12.7	1,243	10.0	10.1	.....	.....
16[2]	4.1	1,195	7.1	9.0	.....	.....
13[3]	11.9	1,091	6.4	6.9	.....	.....
15[1]	3.0	1,017	6.4	12.9	.....	.....
6[2]	14.0	926	4.3	5.2	.....	.....
11[2]	11.5	843	6.6	9.6	.4	10.6
17[1]	20.4	687	5.0	6.6	.4	2.7
8[2]	12.7	640	5.0	7.7	.6	3.8
5[2]	15.3	600	5.0	7.6	.6	13.9
Av.	12.1	1,028	5.8	7.4	.4[5]	5.0[5]

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] On farms for which no seed or labor for seeding are shown data were obtained for fields being harvested the second year. [5] Average for acres seeded.

factor making for the high labor requirements on farm 1. Because of the smaller yields approximately 30 percent more man labor and horse work were used in harvesting a ton of redtop hay than in harvesting a ton of mixed clover hay.

Prices of redtop seed: The prices paid by farmers for redtop seed in small lots from 1921 to 1927 are shown in Table 18.

TABLE 18. Redtop Seed: Prices Per Pound Paid by Farmers, 1921 to 1927.

Year	Prices Paid at Paducah
	Cents
1921	15
1922	23
1923	20
1924	16
1925	15
1926	33
1927	27

Normal production requirements for redtop hay, and assumed relative prices: Normal man labor, horse work and seed requirements for redtop hay and the assumed relative price for

seed are shown in Table 19. The data obtained in this study indicate that a yield of 1250 pounds is a reasonable expectation for the requirements shown.

TABLE 19. Redtop Hay: Normal Production Requirements and Assumed Relative Prices.
(Acre Basis. 1250-pound Yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Cents
Man labor, hrs.	7	[2]
Horse work, hrs.	8	[2]
Seed, lbs.	7	20
Equipment expense, cents[3]	40	.....
Production, lbs.	1,250	[4]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 6, Table 4. [4] Used for feed.

Relation between redtop hay and other enterprises: The seasonal distribution of man labor and horse work for seeding and harvesting redtop hay together with the beginning and ending dates for these operations are shown in Figure 7. While in many respects redtop hay is one of the poorest hay crops of the Purchase it has several points in its favor. It is harvested three weeks or more later than mixed clover hay and after the rush

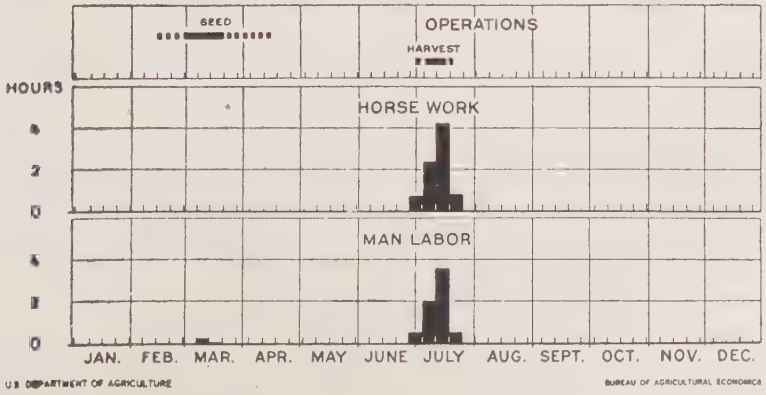

Fig. 7. Redtop hay: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

planting and cultivating season. On most farms no soil treatment is necessary. While yields are usually low, complete failures are not so common as in the case of mixed clovers. If left after the hay crop is harvested it usually provides fair pasturage the following year. The cost of seeding is small as compared with other hay crops.

Timothy Hay

Timothy hay was grown on two farms for which detailed data were obtained. For unlimed bottom soils timothy is a better hay crop than redtop. It usually yields considerably higher on such soils than redtop and the man labor and horse work requirements are only slightly larger per acre and considerably less per ton of hay. The cost of seeding timothy is about the same as the cost of seeding redtop.

Alfalfa

Alfalfa has been successfully grown in the Purchase for many years. About 3000 acres were harvested for hay in 1924. The larger acreages are found in the river bottoms where in some cases one-half or more of the farm usually is kept in alfalfa. However, this crop is being successfully grown on upland farms in practically every section of the Purchase. In this study data on alfalfa were obtained only for upland farms.

The requirements in preparing the land and seeding alfalfa, including hauling and applying limestone and fertilizer, are slightly less for man labor and about the same for horse work as those for an acre of corn prior to harvest. The seed cost for establishing an acre of alfalfa is slightly less than the seed cost for an acre of soybeans. The harvesting requirements are approximately the same as those for harvesting an equal tonnage of other hay crops.

Man labor, horse work, seed and materials used for alfalfa hay: The man labor, horse work, seed, limestone and fertilizers used in preparing the seed bed and seeding alfalfa are shown in Table 20. The rate of seeding ranged from 6.7 to 30 pounds. The limestone used ranged from 1.5 to 8.7 tons. On three farms no manure or fertilizer was used. On two of these alfalfa fol-

lowed tobacco on which superphosphate had been used and on the other alfalfa followed red clover. On one farm 200 pounds of fertilizer and 9 tons of manure were used and on another 400 pounds of fertilizer were used. The man labor used in preparing the seed bed and seeding, including hauling and applying the limestone and fertilizer, ranged from 5.3 to 24.0 hours and the horse work from 9.1 to 47.2 hours.

TABLE 20. Alfalfa Hay: Man Labor, Horse Work and Materials Used and Yields Obtained, Per Acre. Farms Studied, 1927.

Farm No.	Size of Crop	Yield	Harvesting		Seeding[1]					
			Man Labor	Horse Work	Man Labor	Horse Work	Seed	Lime-stone	Super-phos-phate	Manure
	Acres	Lbs.	Hrs.	Hrs.	Hrs.	Hrs.	Lbs.	Tons	Lbs.	Tons
						11.0[2]				
31	1.0	10,000	26.5	31.0	24.0	18.0	18.0	3.3	200	9.0
32	5.0	7,800	21.8	29.1	11.6	22.0	16.0	1.5	400	.....
33	12.5	6,000	16.8	18.6	5.3	9.1	18.0	4.0	400	.....
21[3]	4.0	5,505	14.4	18.2	9.1	18.7	17.7	3.3	[4]	.....
34	3.0	5,000	30.5	31.0	16.0	23.7	8.0	2.0	450	.....
35	1.0	5,000	37.5	30.5	18.0	35.0	30.0	1.5	[5]	.....
36	2.5	5,000	17.2	19.6	18.4	47.2	20.0	2.8	160	.....
37	5.0	3,000	13.6	17.6	18.6	36.0	20.0	4.0	[4]	4.0
						.3[2]				
Av.	4.2	5,692	13.4	15.2	11.4	21.2	17.6	3.2	264	.4

[1] Data taken from records for years prior to 1927. [2] Tractor work. [3] Record for 1926. [4] Seeded on land following tobacco, on which superphosphate had been applied. [5] Seeded on land following red clover.

The man labor and horse work used in harvesting alfalfa and the yields obtained are shown in Table 20. In each case the requirements shown are for all cuttings during one year. Three cuttings were obtained on all farms except farm 37, on which two cuttings were made. The total requirements for harvesting ranged from 13.6 to 37.5 hours of man labor and from 17.6 to 31.0 hours of horse work. The yields in 1927, the year for which harvesting requirements were obtained, ranged from 3000 to 10000 pounds. Most of the hay was cut, raked and hauled to the barn. On a few farms all or a part of one or more cuttings were shocked before being hauled and on three farms part of the crop was baled. The man labor and horse work requirements

were not materially different when the hay was hauled from the windrow to the barn than when raked to the baler and hauled from the baler to the barn. The principal reasons for differences in the harvesting requirements were the size of the fields, the distance of the fields from the barn, the size and condition of the equipment and the management of the crew.

Alfalfa hay yields: When the area harvested in 1927 had been seeded prior to 1926 the yields obtained during the previous years were reported. These yields are shown in Table 21. One crop was seeded in 1926 and harvested the first time in 1927, two crops were seeded in 1925, four in 1924 and one in 1922.

TABLE 21. Alfalfa Hay: Yields Per Acre Obtained on Crops Included in Study.

Farm No.	1923	1924	1925	1926	1927
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
31	.....	.....	5,400	10,000	10,000
32	.....	.....	.....	.....	7,800
33	.....	.....	4,880	6,000	6,000
34	.....	.....	6,000	6,000	5,000
35	.....	.....	.....	2,500	5,000
36	.....	.....	7,200	6,400	5,000
21	.....	.....	.....	5,505	3,500
37	6,000	6,000	6,600	6,600	3,000

Prices of alfalfa seed: The prevailing prices paid by farmers for alfalfa seed in small lots from 1921 to 1927 are shown in Table 15.

Normal production requirements for alfalfa hay, and assumed relative prices: Normal man labor, horse work and other requirements for the preparation of the seed bed and seeding alfalfa and assumed relative prices for expense items are shown in Table 22. Under usual conditions when the land is prepared for summer seeding approximately 20 hours of man labor and 35 hours of horse work are required in breaking, disking, harrowing, hauling and applying limestone and fertilizer and seeding alfalfa. The soil on which alfalfa is seeded should be thoroly inoculated. Approximately 2 tons of ground limestone, 500 pounds of superphosphate and 12 pounds of seed per acre

TABLE 22. Alfalfa Hay: Normal Production Requirements Prior to Harvest and Assumed Relative Prices.
(Acre Basis—Summer Seeding.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements, prior to harvest:		Dolls.
Man labor, hrs.	20	[2]
Horse work, hrs.	35	[2]
Superphosphate, lbs.	500	1.10[3]
Limestone, tons[4]	2	3.25
Seed, lbs.	12	.23
Inoculation[5]		
Equipment expense, cents[6]	75	.....

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Ground to pass a 10-mesh sieve. The price shown includes $2.25 for stone at the station and $1.00 to cover cost of hauling to the farm. [5] Inoculation usually will be obtained from a field that is known to be inoculated. The amount of soil necessary will vary with the method used. If the field to be sown is already inoculated this operation will not be necessary. [6] See footnote 6, Table 4.

are required. If the soil is in a high state of fertility a smaller application of superphosphate may be adequate. The prices shown for the expense items are not greatly different from the averages of recent years. The use of the requirements indicated on carefully selected and well drained land may reasonably be expected to yield good crops for 5 or 6 harvesting seasons.

Normal yields and requirements for harvesting alfalfa hay are shown in Table 23. A normal yield of 2.5 tons per year is

TABLE 23. Alfalfa Hay: Normal Production Requirements for Harvesting.
(Acre Basis, 3 Cuttings, 5000-lb. Yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements, harvesting:		
Man labor, hrs.	20	[2]
Horse work, hrs.	26	[2]
Equipment expense, dolls.[3]	1.25	.....
Production:		
3 cuttings, lbs.	5,000	[4]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 6, Table 4. [4] Used for feed.

indicated. Under usual conditions about 20 hours of man labor and 26 hours of horse work are required for one harvesting season when the crop is cut, raked and hauled to the barn.

Relation between alfalfa hay and other enterprises: The seasonal distribution of man labor and horse work in the preparation of the seed bed and seeding alfalfa when summer seeding is practiced is shown in Figure 8. The approximate beginning and ending dates for each of the principal operations are also indicated. When alfalfa is seeded in summer most of the operations are not definitely fixed as to time and may be done when the needs of the other crops commonly grown in the section are not pressing.

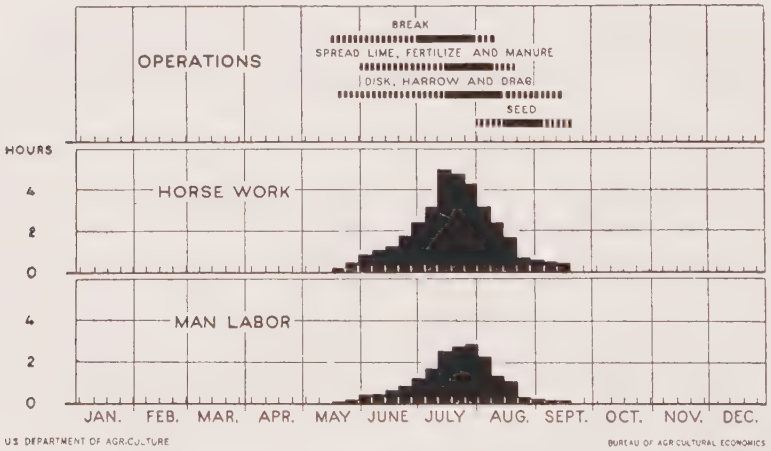

Fig. 8. Alfalfa hay: Seasonal distribution of man labor and horse work for preparing land and seeding and periods of important operations (See explanation under Fig. 2.).

The seasonal distribution of man labor and horse work in harvesting alfalfa together with the approximate beginning and ending dates for each cutting are shown in Figure 9. The first cutting of alfalfa usually is made from May 20 to June 10 and often conflicts with tobacco transplanting, strawberry harvesting, corn cultivation and the harvesting of mixed clover hay. The second cutting usually is made during July when there is little crop work that is pressing. The third cutting usually is made during September and conflicts with the cutting and

housing of tobacco. Alfalfa and corn fit well together but alfalfa seriously conflicts with important operations for tobacco.

Alfalfa is best adapted to those farms that are within 5 or 10 miles of a lime unloading point on which there is one or more well drained fields in a good state of fertility near the barn and on which protein hay can be used effectively for feed. A small acreage of alfalfa on well-drained land will practically always be profitable on farms on which dairy cattle are kept. A small acreage of alfalfa will aid in reducing the risk of other hay crops and in distributing the labor requirements in the production of hay.

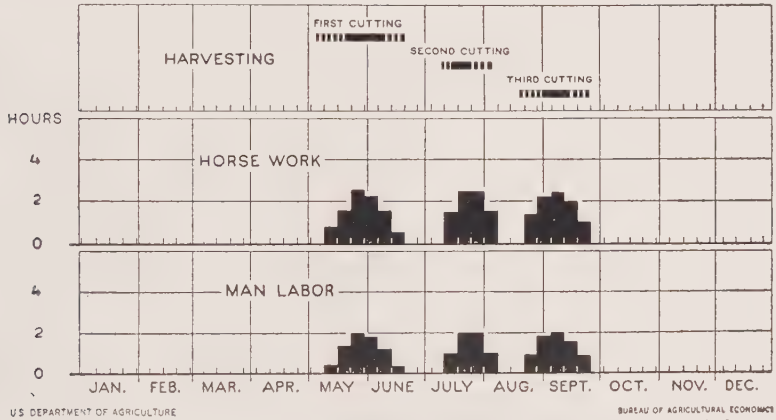

Fig. 9. Alfalfa hay: Seasonal distribution of man labor and horse work for harvesting and period of each cutting (See explanation under Fig. 2.).

Wheat

The acreage of wheat in the Purchase has been gradually decreasing since about 1900. In 1899 about 138,000 acres were grown; in 1909, 67,000 acres; in 1919, 78,000 acres, and in 1924, 14,000 acres. However, wheat has an important place in the agriculture of the region and is being grown profitably on some farms in every community. To grow wheat profitably one must own or have access to equipment that will permit economical seeding, harvesting and threshing. One of the reasons that the acreage of wheat has declined is that many farms are too small to warrant equipment of this kind.

Man labor, horse work and materials used for wheat: The man labor, horse work, seed, fertilizer and other expense items used for wheat are shown in Table 24. Data are given for three farms for two years and for the remainder for one year. Most of the data are for 1925.

The yields ranged from 4.2 to 32.1 bushels per acre. The man labor used ranged from 7.8 to 29.6 hours and the horse work from 10.5 to 60.2 hours. Unusually large amounts of man labor

TABLE 24. Wheat: Man Labor, Horse Work and Materials Used and Yields Obtained Per Acre. Farms Studied, 1924-26.

Farm No.	Size of Crop	Yield		Man Labor	Horse Work	Seed	Fertilizer	Twine
		Grain	Straw					
	Acres	Bus.	Lbs.	Hrs.	Hrs.	Bus.	Lbs.	Lbs.
38[1]	4.0	32.1	3,270.0	28.2	41.0	1.2	225.0	3.1
39[1]	8.0	25.1	2,250.0	15.2	20.2	1.3	218.8	2.8
40[1]	10.0	22.4	1,142.0	14.5	17.4	1.5	200.0	2.8
2[2]	10.6	21.7	1,225.5	17.3	21.6	1.3	188.5	2.1
41[1]	3.0	17.5	800.0	17.3	29.3	1.2	266.7	1.7
42[1]	7.0	16.4	1,148.5	14.9	22.4	1.6	257.1	1.7
43[1]	8.0	16.1	1,110.2	26.5	60.2	1.2	150.0	2.2
44[1]	5.0	16.0	800.0	16.7	24.8	1.5	200.0	1.6
9[1]	6.4	15.9	628.9	26.3	58.5	1.3	.....	1.9
					1.1[3]			
45[1]	20.0	15.8	1,275.0	17.2	10.8	1.3	.....	1.7
					3.3[3]			
46[1]	30.0	15.3	[4]	14.1	9.5	1.4	200.0	1.3
					.8[3]			
47[1]	40.0	15.0	1,083.0	13.4	15.2	1.2	.....	1.7
48[1]	4.5	14.8	933.3	20.0	38.3	1.6	266.7	1.7
49[1]	6.0	13.7	1,870.0	12.0	21.0	1.0	166.7	2.0
					.6[3]			
19[2]	11.1	13.3	976.0	20.9	22.9	1.2	14.6	1.4
50[1]	5.0	12.4	780.0	15.2	21.0	1.2	200.0	1.4
12[1]	1.2	12.0	280.0	29.6	42.4	1.6	.....	1.6
					.9[3]			
4[2]	7.1	11.6	772.8	20.2	15.1	1.1	70.8	1.3
51[1]	4.0	10.8	900.0	15.4	22.3	1.5	150.0	1.0
52[1]	16.0	9.1	500.0	8.8	20.4	1.0	75.0	.5
53[1]	9.0	8.4	493.3	12.9	25.2	1.2	200.0	.8
54[1]	8.0	8.0	450.0	13.6	20.9	1.2	312.5	1.1
17[1]	13.5	7.5	[4]	10.7	18.8	.9	85.7	.7
14[1]	16.2	5.4	304.2	8.0	12.2	1.2	.....	.8
3[1]	8.6	4.2	243.9	14.8	25.6	1.0	.....	.5
					.6[3]			
Av.	10.4	13.9	969.0	15.6	20.6	1.2	106.9	1.5

[1] Records covering one year. [2] Records covering two years. [3] Tractor. The hours are above the horse hours for farms using tractors. [4] Not reported. Acreage for farms excluded in calculating average yield of straw for the group.

and horse work were used on farm 38, partly because of the small acreage and high yield and partly because of small equipment and ineffective work. The amount of seed used ranged from .9 to 1.6 bushels per acre. Fertilizer was used on all but six farms, the amount ranging from 14.6 to 312.5 pounds per acre. Usually the application consisted of about 200 pounds per acre, superphosphate being most commonly used.

Farms 39, 40 and 2 were among those on which good practices were used and good results obtained. On each of these farms wheat was grown in a rotation consisting of corn or tobacco, wheat and clover. The seed bed was thoroly prepared and the crop on each farm seeded during early October. In each case fertilizer was used for the cultivated crop preceding wheat and about 200 pounds also used on the wheat. From 1.3 to 1.5 bushels of seed were sown per acre. The harvesting was done in the usual way on each farm, the man labor and horse work being included for cutting, shocking, hauling the bundled grain to the separator and the threshed grain to the barn.

Farms 17, 14 and 3 were among those on which poor results were obtained. The yields were 7.5, 5.4 and 4.2 bushels per acre, respectively. From .9 to 1.2 bushels of seed were used per acre and the crops sown on each farm during late October and early November. No fertilizer was used on farms 14 and 3 and only 85.7 pounds used per acre on farm 17. On farm 3 the seed bed was poorly prepared, the land being broken in September.

Wheat yields: The average yields of wheat obtained in Kentucky from 1921 to 1927 are shown in Table 25. The data

TABLE 25. Wheat: Yield Per Acre, Kentucky, 1921 to 1927.

Year	Average Yield
	Bus.
1921	10.0
1922	11.5
1923	12.4
1924	10.3
1925	14.0
1926	18.5
1927	9.5

indicate that the yields in 1925, the year for which most of the data on wheat were obtained, were about 14 per cent above the average yields from 1921 to 1927.

Prices of wheat: The yearly July to September average prices received by Kentucky farmers for wheat (Kentucky farm price) from 1921 to 1927 are shown in Table 26. The average prices received on the farms studied are also shown.

TABLE 26. Wheat: Prices Per Bushel Received by Farmers, 1921 to 1927.

Year	Kentucky Farm Price, Average July to September	Prices Received on Farms Studied
	Dolls.	Dolls.
1921	1.20	.....
1922	1.14	.....
1923	1.07	.....
1924	1.26	1.27
1925	1.60	1.62
1926	1.35	1.41
1927	1.38	.....

Prices of expense items for wheat: The prices paid by farmers for twine and threshing costs from 1921 to 1927 are shown in Table 27.

TABLE 27. Wheat, Expense Items: Prices Paid by Farmers for Threshing and Twine, 1921 to 1927.

Year	Threshing Costs Per Bushel[1]	Twine Cost Per Pound	
		Retail Prices Paid at Paducah	Prices Paid on Farms Studied
	Cents	Cents	Cents
1921	15	17	....
1922	15	14	....
1923	12	....	....
1924	12	14	14
1925	12	17	18
1926	12	17	17
1927	12	17	....

[1] This consists of a contract charge for the engine, separator, fuel and two men to operate the equipment.

Normal production requirements for wheat, and assumed relative prices: Normal man labor, horse work, fertilizer and other requirements for wheat, and assumed relative prices for wheat and expense items are shown in Table 28. The results obtained on the farms studied and on the Lone Oak and Mayfield experiment fields indicate that a yield of 14 bushels is a conservative expectation when the requirements shown are used and reasonably good management applied.

TABLE 28. Wheat: Normal Production Requirements and Assumed Relative Prices.
(Acre Basis, 14-bushel Yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Dolls.
Man labor, hrs.	15	[2]
Horse work, hrs.	22	[2]
Seed, bus.	1¼	[2]
Superphosphate	[3]	.....
Twine, lbs.	2	.16
Contract threshing, per bu., dolls.[4]	14	.12
Equipment expense, cents[5]	75	.....
Production:		
Grain, bus.	14	1.30
Straw, lbs.	1,200	[6]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] See footnote 4, Table 4. [4] This consists of contract charge for engine, separator, fuel, and two men to operate the equipment. [5] See footnote 6, Table 4. [6] Used on farm.

The man labor and horse work requirements are for preparing the seed bed and seeding after a cultivated crop. They include 6 hours of man labor and 14 hours of horse work prior to harvest and 9 hours of man labor and 8 hours of horse work for harvesting. The contract charge for threshing and prices for twine are approximately the average costs of recent years. The price for wheat is approximately the average of prices obtained from 1921 to 1927. However, at any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between wheat and other enterprises: The seasonal distribution of man labor and horse work together with the beginning and ending dates for the principal operations are shown in Figure 10. The preparation of the seed bed and the seeding of wheat usually follow the cutting and housing season for tobacco, and precede the season for snapping and hauling corn. Cutting and shocking conflicts with the cultivating season for inter-tilled crops and hay harvesting. Threshing is usually done after the cultivating season for most crops and before the suckering and cutting and housing season for tobacco.

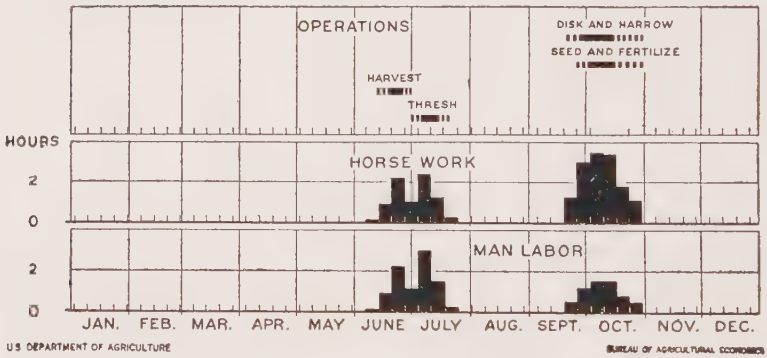

Fig. 10. Wheat: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

The advantages of wheat in the Purchase are that the crop is seeded after the cultivated crops are harvested, serves as a cover crop over winter, provides some pasturages in the late fall and early spring, and a seed bed for mixed clovers and, in some cases, alfalfa. These advantages are such that this crop should receive more careful consideration on many farms than has been given in recent years. Wheat is relatively best adapted to those farms that are large enough to use effectively equipment for seeding and harvesting and on which the straw can be utilized to good advantage.

Tobacco[17]

Until recent years tobacco has been the only important source of income on most farms in the Purchase. It is still the most important source of income on more farms than any other crop or class of livestock. Tobacco requires a comparatively small amount of land and large amounts of man labor and horse work, approximately nine times as much man labor and twice as much horse work being needed for an acre of tobacco as for an acre of corn harvested from the standing stalk.

Man labor, horse work and materials used for tobacco: The man labor, horse work, fertilizer and other materials used for tobacco are shown in Table 29. On the farms for which detailed data were obtained for the entire three-year period the average yields per acre ranged from 614.9 pounds to 1052.6 pounds. On the farms for which data are available for only one year the highest yield was 1325.2 pounds and the lowest 361.9 pounds. The man labor used ranged from 185.2 to 400.2 hours per acre and the horse work from 75.1 to 213 hours.

On farm 7a, on which the yield was 1325.2 pounds and on which the largest amounts of man labor and horse work were used per acre, only 1.7 acres of tobacco were grown. Tobacco was planted after a cultivated crop and a heavy application of manure made before breaking. The land was broken more deeply than usual and large amounts of man labor and horse work used for this operation. Unusually large amounts of man labor and horse work were used in disking, dragging and harrowing. The land was laid off both ways with a one-horse plow, fertilizer dropped in the hill by hand and hills made with a hoe. Unusual care was taken in transplanting and the tobacco was plowed with a one-horse plow every week or ten days until ready to top. It was carefully and thoroly hoed twice. Comparatively large amounts of man labor and horse work were used for the remaining operations because of the unusually heavy yield. That this crop was well handled is evident from the fact that the price

[17] Tobacco as used in this bulletin refers to the Paducah-Mayfield dark fired type.

TABLE 29. Tobacco: Man Labor, Horse Work and Materials Used and Yields Obtained, Per Acre. Route Farms, 1924-26, Inclusive.

Farm No.[4]	Av. Size of Crop	Yield	Man Labor	Horse Work	Wood for Plant Bed	Canvas	Manure	Fertilizer	Spray Material[6]	Wood for Curing
	Acres	Lbs.	Hrs.	Hrs.	Lds.	Yds.	Tons	Lbs.	Lbs.	Lds.
7a[1]	1.7	1325	400.2	213.0	[7]	30.1	9.0	166	1.8G	3.0
8a[3]	6.4	1053	304.4	114.4	.2	22.4	3.8	441	1.2G	3.8
23[1]	5.0	1052	225.0	88.3	.8	30.3	.....	333	1.6G	1.4
14[2]	6.7	1027	206.3	91.5	.2	19.0	3.1	288	3.0M	2.2
13a[3]	4.2	1016	289.8	94.4	1.1	38.8	.7	124	2.0G	3.6
17a[3]	7.3	826	217.8	94.0	.1	17.7	6.2	258	1.4M	.9
6[2]	6.1	821	237.2	113.8	.1	17.1	3.6	125	1.7G	2.7
15[1]	4.7	814	194.6	103.7	[7]	21.3	.....	.....	.5G	3.2
16[2]	8.8	770	269.8	129.2	.1	23.0	2.2	125	.5G	1.3
22[1]	6.3	765	186.8	109.6 1.0[5]	.3	20.0	2.1	188	.....	1.9
19b[1]	15.2	725	228.4	96.9	.7	9.2	.....	.....	.....	2.6
3a[1]	3.4	722	195.1	79.2	.3	23.8	2.4	89	.9G	1.5
2a[2]	5.8	711	196.2	84.8	.1	24.4	.1	127	2.3M	1.9
11[2]	5.5	704	276.0	134.9	.6	20.6	2.6	28	.3G	2.7
13b[2]	11.1	693	241.1	75.1	.4	14.6	.3	22	.3G	.7
12[1]	3.5	681	382.2	117.2 5.5[5]	1.7	31.2	1.5	.....	2.3G	2.0
4a[1]	1.8	659	367.8	138.8 1.0[5]	[7]	54.6	.....	619	6.8L	4.6
20[2]	3.6	653	229.9	102.1	1.4	12.6	5.9	148	.....	2.4
5[3]	3.6	646	246.1	112.0	.2	34.7	3.3	1	1.3G	2.2
8b[1]	9.9	636	207.1	105.2 3.6[5]	[7]	15.1	.9	101	.....	1.5
4b[3]	4.6	615	185.2	74.2	.4	16.8	1.4	225	3.4L	1.4
17b[2]	4.9	593	201.1	93.5	.2	20.0	3.3	106	.....	1.7
9[1]	8.3	544	264.7	135.2	2.4	24.0	2.8	276	1.7L	1.8
2b[1]	8.2	540	195.7	94.7	.3	36.7	1.2	.....	.7G	1.0
18[2]	3.7	536	203.8	95.9 1.5[5]	[7]	26.8	8.5	154	1.8M	1.5
19a[2]	7.9	522	256.4	102.6	.7	17.8	2.6	241	1.6M	2.1
7b[2]	6.7	485	239.3	122.1	.6	23.0	.8	104	.9G	1.8
3b[1]	3.9	362	214.4	82.0	.3	20.5	.....	.....	1.0G	1.3
Av.	6.0	732	238.0	.4[5] 102.4	.4	21.4	2.4	155	1.2M	2.0

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Farms on which part of the crop was produced by croppers are designated by "a" and "b." The "a" part is landlord's tobacco, "b" cropper's. [5] Tractor. The hours are above the horse hours for farms using tractors. [6] Figures marked "L" refer to arsenate of lead, "G" paris green, "M" both. The average is made up of 0.6 lb. "L" and 0.6 lb. "G." [7] Used brush and briars.

received per pound was about twice the average for the season on the market on which it was sold.

On farm 8a, on which an average yield of 1052.6 pounds was obtained during the three-year period and on which comparatively large amounts of man labor and horse work were used, tobacco was manured and fertilized heavily with superphosphate and the various operations thoroly performed. More economical methods were used in laying off, fertilizing and hill-

ing than on farm 7a in that the land was thoroly prepared, the fertilizer applied broadcast and most of the work in hilling was done with the plow. Slightly more effective work was done on most other operations than on farm 7a. Unusually careful attention was given in stripping and grading and the prices received were considerably higher than those received by most farmers in the section.

On farm 14, for which records for two years are included, good yields were obtained, and only a moderate amount of fertilizer and comparatively small amounts of man labor and horse work were used. The tobacco was grown in a three-year rotation consisting of tobacco, small grain and clover and an average of 288.4 pounds of home-mixed fertilizer, mostly superphosphate, was used per acre. The clover sod was turned under in the fall and only moderate amounts of man labor and horse work were required in disking, harrowing and dragging to put the soil into good condition. Part of the acreage was marked off with a two-row marker. Little hoe work was done in hilling or in cultivating. Moderate amounts of man labor were used in cultivating, topping, suckering, spraying, worming, and cutting and housing. Effective work was done and, in the main, the crop was well handled until put into the barn. The curing was neglected and, altho a good yield was obtained, the prices received both years were well below the prices received by most other growers getting good yields. The results obtained on this farm illustrate the possibilities of the use of labor saving practices for most operations and the effect of neglecting the important operation of curing. Adequate housing facilities and good curing practices, including continued firing at proper temperatures, are essential for good quality tobacco.

The yards of canvas shown in Table 29 represent the canvas used or the square yards of plant bed provided per acre. Since canvas usually lasts for two or three years, only from one-third to one-half as many yards of canvas were purchased each year as are shown in the table. The tons of manure and pounds of fertilizer shown are the amounts applied to the tobacco crop. Usually a larger part of the applications for tobacco was left in

the soil for use by succeeding crops than remained from previous applications to other crops.

Prices of tobacco: The average prices received by growers selling tobacco at Mayfield from 1922 to 1927 are shown in Table 30. These are prices for crops grown during the year indicated but marketed for the most part during the following year.

TABLE 30. Tobacco: Prices Per Pound Received by Farmers, 1922 to 1927.

Year Grown	Prices for Tobacco Delivered at Mayfield	Prices Received on Route Farms
	Cents	Cents
1922	13.6	.....
1923	9.6	.....
1924	10.5	8.2
1925	7.4	6.6
1926	6.2	7.7
1927	11.5	.....

Prices of expense items for tobacco: The prices paid by farmers for nitrate of soda and arsenate of lead from 1922 to 1927 are shown in Table 31. The prices for arsenate of lead are the cash prices paid by farmers for lots of less than 25 pounds. The prices for nitrate of soda are cash prices paid by farmers for small lots in 100-pound bags.

TABLE 31. Tobacco, Expense Items: Prices Paid by Farmers for Nitrate of Soda and Arsenate of Lead, 1922 to 1927.[1]

Year	Nitrate of Soda Price Per 100 Lbs.	Arsenate of Lead Price Per Lb.
	Dollars	Cents
1922	4.00	30
1923	4.25	30
1924	3.50	25
1925	3.75	25
1926	3.50	22
1927	3.25	20

[1] Paducah.

Normal production requirements for tobacco, and assumed relative prices: Normal man labor, horse work, fertilizer and other material requirements for tobacco and assumed relative

prices for tobacco and expense items are shown in Table 32. The yields obtained on the farms in this study, as shown in Table 29, and data for other farms, together with the results obtained on the Mayfield experiment field, indicate that 950 pounds of tobacco per acre is a conservative expectation when the crop is grown in a rotation including legumes, manure and fertilizer are used and good practices followed. The requirements include 250 hours of man labor and 90 hours of horse work. These requirements assume a reasonable use of labor-saving practices and provide for considerably more attention in curing, stripping and grading than is usually given.

TABLE 32. Tobacco: Normal Production Requirements and Assumed Relative Prices.

(Acre Basis, 950-lb. Yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Dolls.
Man labor, hrs.	250	[2]
Horse work, hrs.	90	[2]
Complete fertilizer, lbs.[3]	500	2.03[4]
Plant-bed wood, lds.	.5	[2]
Canvas, yds.[5]	20	.05
Arsenate of lead, lbs.	4	.25
Barn wood, lds.	3.5	[2]
Building expense, dolls.[6]	5	.....
Equipment expense, dolls.[6]	1.50	.....
Production, lbs.	950	.10

[1] For an explanation of this term see page 324. [2] Farm value. [3] This is a home-mixed fertilizer consisting of the following:

Superphosphate	1150 lbs. @ $1.10	$12.65
Nitrate of soda	675 lbs. @ 3.50	23.62
Muriate of potash	175 lbs. @ 2.50	4.38
	2000 lbs.	$40.65

This is approximately a 5-9-4 formula. A considerable part of the fertilizing value of the application is left in the soil for use by other crops. The amount shown is for one round of a rotation in which four crops are removed. [4] Price per 100 pounds. [5] Good quality canvas usually will last three years. Only one-third of the amount required will need to be bought each year. [6] See footnote 5, Table 4.

Twenty square yards of plant bed usually will provide enough plants to set an acre of tobacco at one drawing. The requirements shown for canvas provide for covering the total

amount of bed prepared. However, since good quality canvas normally lasts for three seasons, only one-third of this amount will need to be bought each year. For spraying, two applications of arsenate of lead each consisting of two pounds are shown. Requirements for a home-mixed fertilizer consisting of nitrate of soda, superphosphate and muriate of potash are included. A ready-mixed fertilizer containing not less than 4 percent of nitrogen, 4 percent of potash and from 10 to 12 percent of phosphoric acid would serve the same purpose but would probably cost slightly more than is indicated. Of the fertilizer shown it is expected that a considerable part, especially the phosphate, would remain in the soil and be used by other crops in the rotation.

A price of 10 cents per pound for tobacco is assumed. This is approximately the average price received in the section from 1922 to 1927. The price for arsenate of lead is slightly above the average price paid from 1922 to 1927. The price for nitrate of soda is slightly lower than the average price paid from 1922 to 1927. The prices for other expense items are approximately the averages of prices prevailing in recent years. However, at any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between tobacco and other enterprises: The seasonal distribution of man labor and horse work on tobacco is shown in Figure 11. The approximate beginning and ending dates for each of the principal operations are also indicated. The heaviest man labor requirements for tobacco usually are in preparing the land and planting in May and early June, suckering, spraying and worming in late July, August and early September, cutting and housing in September and stripping during the winter season. The heaviest horse work requirements are in preparing the land for planting in May. Usually tobacco planting follows corn planting, except when heavy rainfall or other unusual climatic conditions delay corn planting, but tobacco planting and strawberry harvesting generally conflict. In most cases

the other heavy requirements of tobacco are during seasons when other farm work is not pressing.

Some of the requirements of tobacco are very definitely fixed as to time. Tobacco may be transplanted over a period of about a month, yet on a particular farm during a given season the number of days that can be used for transplanting tobacco

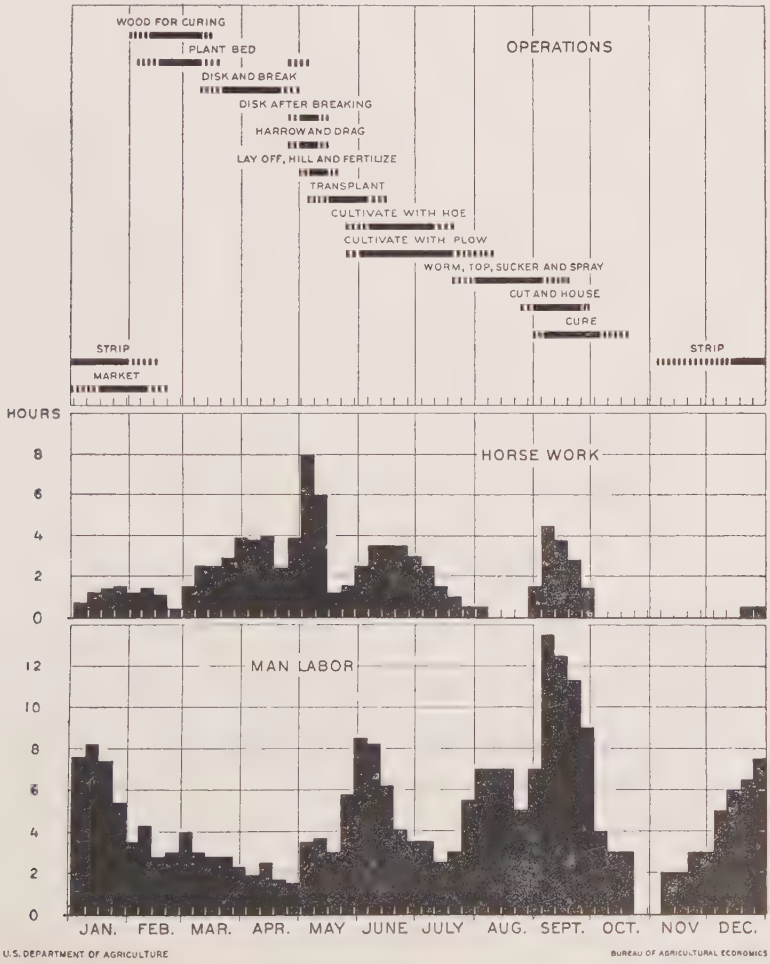

Fig. 11. Tobacco: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

is limited. Tobacco must be transplanted after a rain when the soil is moist and when the plants are ready. While the cutting and housing extends over a month or more, all the tobacco planted at one time, other things being equal, is ready for cutting and housing at one time, and all that goes into one barn should be cut and housed at the same time.

Tobacco makes some contributions to other crops. Tobacco land is easily prepared for small grain and small grain yields are usually slightly larger after tobacco than after most other crops. Tobacco is a desirable crop to precede strawberries since tobacco is clean cultivated late in the season and usually less trouble is experienced with insects the following spring: also weeds are more easily controlled after it than after most other crops.

In the past, with tobacco as the chief source of income, other crops have been selected that fit in well with tobacco; but now that tobacco prices are less favorable the order has been reversed on the most profitable farms and the tobacco acreage is decided upon with the view of interfering as little as possible with the other crops. In most cases this means a small acreage of tobacco as compared with the acreage of other crops.

Strawberries

In recent years the strawberry crop has become an important source of income on many farms. In 1915 growers in McCracken County in the vicinity of Paducah began shipping strawberries in carlots. This commercial area has expanded until in 1927 more than 350 cars were shipped. Exclusive of picking and grading, which is usually done on a contract basis, an acre of strawberries requires each year, on the average, slightly more than one-half as much man labor and about three-fourths as much horse work as an acre of tobacco. If picking and grading are included, an acre of strawberries requires annually about one and one-half times as much man labor as an acre of tobacco.

Man labor, horse work and materials used for strawberries. A preliminary survey indicated that the requirements in grow-

ing and harvesting strawberries in the Purchase were about the same for the first three years as those for Christian County, of which a study was made for the period from 1921 to 1924.[18] Three crops often are harvested from one planting in Christian County, whereas only two crops are harvested from one planting in the Purchase. The data obtained in Christian County have been used in working out normal production requirements for the Purchase.

On those farms in the Christian County study on which only two crops were harvested from one planting, the yields ranged from 48 to 246 crates[19] per year. In general, on the farms on which the larger yields were obtained, the crop was planted early enough in the season to get a good stand. Fertilizer was used and the crop given careful and timely attention with the plow and hoe during the first growing season, and thoroly worked out after the first crop was harvested.

The man labor and horse work requirements prior to harvest were influenced by the crop grown preceding strawberries, the timeliness of operations and the thoroness with which the cultivation was done. Requirements in harvesting depend largely upon the yield. It is usually advisable to plant strawberries after some crop that has been thoroly cultivated during the preceding season. Careful, timely attention is especially desirable during the early part of the growing season the first year, since any considerable growth of grass and weeds usually necessitates a large amount of work with the hoe.[20]

Prices of strawberries: The prices received by growers shipping thru one of Kentucky's largest cooperative associations located at Bowling Green, Ky., from 1921 to 1927 are shown in Table 33. These are the net prices for 24-quart crates. They include all strawberries shipped thru this association during the years indicated. Only freight shipping facilities are available at Bowling Green. The prices received by growers shipping from Paducah where express facilities are available were slightly

[18] See Kentucky Experiment Station Bulletin 255.
[19] 24-quart crates.
[20] A full discussion of methods and practices in producing strawberries in western Kentucky is presented in Kentucky Extension Circular 216.

TABLE 33. Strawberries: Net Prices Received by Growers, Bowling Green, Ky., 1921 to 1927.

Year	Price Per 24-Quart Crate
	Dolls.
1921	3.67
1922	2.34
1923	2.40
1924	3.40
1925	4.84
1926	2.73
1927	3.28

higher during the years for which data were obtained than those shown in Table 33.

Prices of expense items: The prices paid by growers for strawberry plants, crates and picking are shown in Table 34. If strawberry plants are bought in the field and dug by the purchaser they may usually be obtained at prices about $1.50 less per 1000 than those shown in this table.

TABLE 34. Strawberries, Expense Items: Prices Paid by Growers for Plants, Picking and Crates. McCracken County, 1921 to 1927.

Year	Plants Per 1000[1]	Picking Per 24-Quart Crate[2]	Crates[3]
	Dolls.	Cents	Cents
1921	3.50	80	45
1922	3.50	80	33
1923	3.50	80	32
1924	3.50	80	33
1925	3.50	80	32
1926	3.50	80	35
1927	2.75	80	34

[1] Prices paid at Paducah or on farms near Paducah for plants grown in McCracken County. [2] Contract picking cost. In addition there was a charge of 20 cents per crate each year when the grading and packing was done on a contract basis. [3] Prices paid at Paducah for knocked down 24-quart crates.

Normal production requirements for strawberries, and assumed relative prices: Normal man labor, horse work and material requirements for strawberries, and assumed relative prices for expense items and strawberries are shown in Table 35 The man labor and horse work requirements are for planting and cultivating the first year, cultivating after the crop is harvested the second, and supervision in picking and grading and hauling the crop to market the second and third years. The strawberry

TABLE 35. Strawberries: Normal Production Requirements and Assumed Relative Prices.
(Acre Basis, 140-crate Yield During 2-year Crop Period.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements, prior to harvest:		Dolls.
Man labor:		
1st year, hrs.	120[2]	[3]
2nd year, hrs.	50[2]	[3]
Total, hrs.	170[2]	[3]
Horse Work:		
1st year, hrs.	60[2]	[3]
2nd year, hrs.	25[2]	[3]
Total, hrs.	85[2]	[3]
Plants	4,500	3.50[4]
Superphosphate, lbs.	400	1.10[5]
Straw for mulching, tons	2	[3]
Equipment expense, dolls.[6]	1.50	.....
Production requirements, harvesting:		
Man labor, two years, hrs.	100	[3]
Horse work, two years, hrs.	50	[3]
Picking, contract, crates	140	.80
Grading and packing, crates	140	.20
Crates	140	.34
Equipment expense, dolls.[6]	1.50	.....
Building expense, dolls.[6]	1.00	.....
Production, 24-qt. crates	140	3.00

[1] For an explanation of this term see page 324. [2] Includes hauling straw and mulching. [3] Furnished by farm. [4] Price per thousand. [5] Price per 100 pounds. [6] See footnote 6, Table 4

plant requirements shown are for planting 3 feet by 3 feet and 6 inches.

The strawberry yields shown are slightly above average yields in the section but represent a conservative expectation for the requirements indicated. Many growers get considerably larger yields by using requirements similar to those indicated and reasonably good practices.

The prices for expense items are approximately the average prices prevailing from 1921 to 1927 (See Table 34). The prices for strawberries are slightly below the average price of the same period (See Table 33). At any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between strawberries and other enterprises: The seasonal distribution of the man labor and horse work for strawberries for the full crop period, together with the beginning and ending dates for the principal operations are shown in Figures 12, 13 and 14. The requirements for picking and grading, which are usually done on a contract basis, are shown separately. The strawberry crop is transplanted in March and early April. It is cultivated in May, June, July and August the first year, and in July and August the second year. Late May and early June is the usual time for harvesting strawberries. Strawberry harvesting usually competes with tobacco planting and often with corn planting or the early part of corn cultivation. The other seasonal requirements for strawberries do not seriously conflict with the requirements for the other crops commonly grown in the Purchase. The strawberry crop has fewer conflicts with corn, mixed clover hay and the other feed crops than has tobacco.

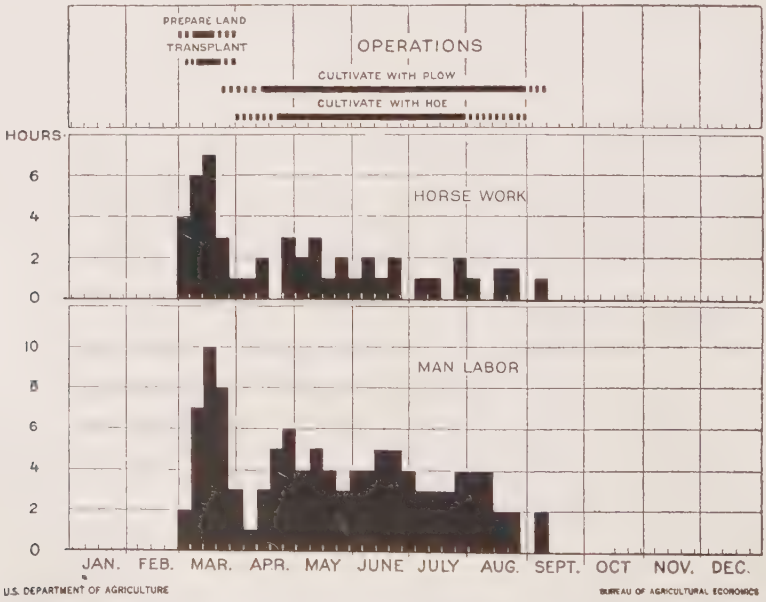

Fig. 12. Strawberries, first year: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

As a rule, the labor requirements are better distributed when tobacco and strawberries are grown together than when either crop is grown without the other. Tobacco plant beds can be prepared before strawberries are planted. The strawberry crop can be planted before time for plowing tobacco land. The larger part of the cultivation for strawberries is done before the suckering, and cutting and housing for tobacco. Strawberries may be mulched in winter when it is too cold and dry to strip tobacco. While tobacco planting and strawberry harvesting conflict, usually a large part of strawberry harvesting is done with contract labor.

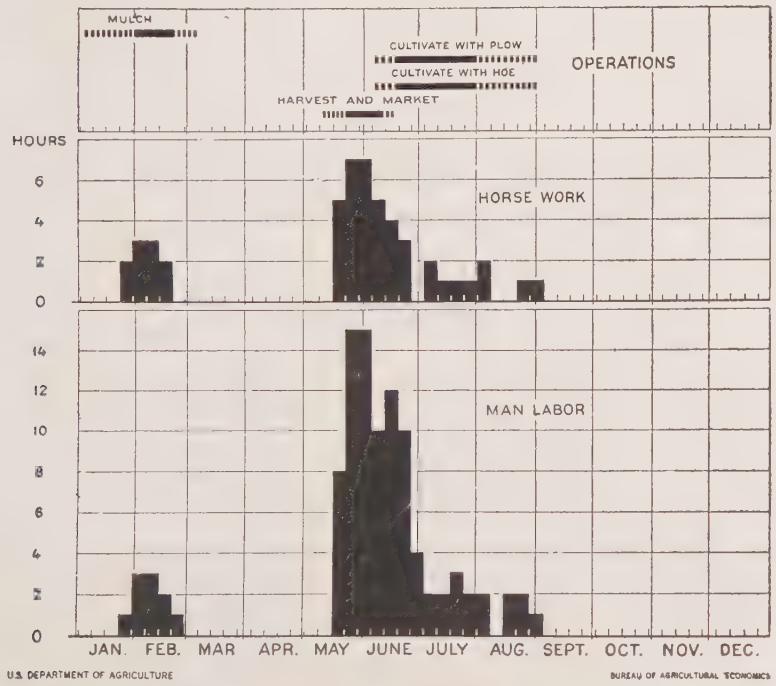

Fig. 13. Strawberries, second year: Seasonal distribution of man labor and horse work and periods of important operation (See explanation under Fig. 2.).

The strawberry crop is highly perishable and must be given careful and timely attention during the harvesting season. The hauling of strawberries long distances is expensive and often

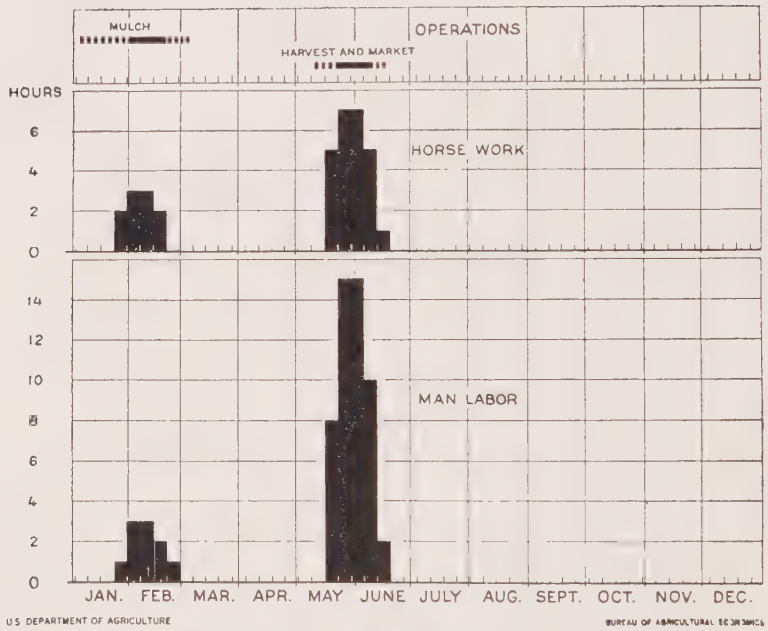

Fig. 14. Strawberries, third year: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

hazardous. Consequently, strawberries are best adapted to those farms within 6 or 8 miles of a strawberry-shipping point and on which extra labor for picking and grading can be obtained.

To market strawberries successfully it is usually necessary that the acreage shall be sufficient to load at least one car daily. An area with farmers growing 150 or more acres within a radius of 6 or 8 miles of a shipping point and marketing the crop co-operatively is a desirable unit in strawberry production.

Dewberries

Dewberries have been grown profitably for sale on a few farms for several years. In 1926 some dewberries were shipped in mixed cars with other perishable crops. In 1927 there was a small acreage of dewberries on 200 or more farms in this

region. The requirements and returns for dewberries are more similar to those for strawberries than to those for any of the other crops for which data are presented.

The cost of planting an acre of dewberries is about twice as great as the cost of planting an acre of strawberries. From 10 to 15 crops of dewberries usually are harvested from one planting. The prices of dewberries usually are from 15 to 20 percent less per crate than the prices of strawberries, and the yields also are slightly less. The cost of crates and the contract charge for picking and grading per acre are about the same as those for strawberries.

Dewberries usually are planted at about the same time as strawberries and harvested about two weeks later than strawberries. During the first year about one-half as much man labor and horse work are required in planting and cultivating an acre of dewberries as for an acre of strawberries. The man labor and horse work requirements for cultivating the second and later years are about one-half as large per year as those for cultivating an acre of strawberries the second year. For the farmer who is specializing in small fruit crops a small acreage of dewberries and a small acreage of strawberries are likely to result in larger profits than a large acreage of either crop, provided adequate marketing facilities are available for both.

Sweetpotatoes

In recent years sweetpotatoes have become an important cash crop in many sections of the Purchase. On some farms this crop is the most important source of income. Sweetpotatoes have been an important cash crop in some sections of western Tennessee in which conditions are similar to those prevailing in the Purchase for about 20 years. An acre of sweetpotatoes requires slightly more horse work and a little more than one-half as much man labor as an acre of tobacco. The other costs for sweetpotatoes are small as compared with most other cash crops.

Man labor, horse work and materials used for sweetpotatoes: The man labor, horse work, seed, fertilizer and manure used in producing sweetpotatoes are shown in Table 36. Due to the fact that sweetpotatoes were grown on only one farm for which detailed data were obtained for all crops and livestock, data showing the requirements and yields for this crop were obtained from other farms. These additional records were obtained for 1925 and consequently all data shown for sweetpotatoes except those for one farm are for that year.

TABLE 36. Sweetpotatoes: Man Labor, Horse Work and Materials Used and Yields Obtained, Per Acre. Farms Studied, 1925.

Farm No.	Size of Crop	Yield	Man Labor	Horse Work	Seed	Super-phos-phate	Manure[1]
	Acres	Bus.	Hrs.	Hrs.	Bus.	Lbs.	Tons
13[2]	2.1	184.8	213.4	110.9	6.2	.....	.9
55	2.8	160.0	174.9	145.0	5.8	181.8	1.8
56	3.0	158.3	210.8	131.3	10.0	.....	1.7
57	1.0	150.0	132.5	123.5	3.0	.....	1.0
58	1.0	128.0	118.0	110.0	3.0	.....	1.5
59	1.0	106.0	221.5	213.5	4.0	.....	1.5
60	1.0	104.0	201.0	122.0	3.5	.....	1.5
61	3.0	102.0	107.5	67.6	6.0	.....	.....
13	2.7	94.0	186.6	36.9	4.5	.....	.8
62	1.2	84.0	108.4	88.4	2.0	.....	1.2
63	2.0	56.0	120.2	86.2	2.5	.....	.8
Av.	1.9	123.5	165.2	104.9	5.3	24.1	.9

[1] Used for hotbed. [2] 1926 record.

The yields ranged from 56 to 184.8 bushels. The man labor ranged from 107.5 to 221.5 hours and the horse work from 36.9 to 213.5 hours. In each case the man labor and horse work shown include the quantities used for all operations from treating and bedding the seed to hauling to market.

Only a small acreage of sweetpotatoes was grown on each farm, one acre being grown on the farm on which the largest amounts of man labor and horse work were used. With a larger

acreage perhaps slightly less man labor and horse work would have been used per acre. On farm 61, on which the smallest amount of man labor and the second smallest amount of horse work were used, sweetpotatoes have been grown commercially for about ten years. This crop has been grown for sale on farms 55 and 56 for a similar length of time. These three farms have potato houses and cure the crop, and small amounts of man labor are included for this operation. On farm 55 the sweetpotatoes were sold locally in small lots and large amounts of man labor and horse work were used for marketing. On most of the other farms sweetpotatoes were grown commercially for the first time in 1925. On all the farms except 55, 56 and 61 the crop was hauled directly from the field to market. The distance hauled ranged from 2 to 8 miles.

The seed used ranged from 2 to 10 bushels per acre. Farm 55, on which the largest yield was obtained in 1925, was the only farm on which fertilizer was used. Manure was used in making hotbeds on all farms except one, the amounts used ranging from .8 to 1.8 tons for each acre of sweetpotatoes. On farm 61 the seed sweetpotatoes were sprouted in a bed with underground flues.

Sweetpotato yields: The average yields of sweetpotatoes obtained in Kentucky and Tennessee from 1921 to 1927 are shown in Table 37. These data indicate that the yields in 1925,

TABLE 37. Sweetpotatoes: Yields Obtained Per Acre in Kentucky and Tennessee, 1921 to 1927.

Year	Kentucky Yield Per Acre	Tennessee Yield Per Acre
	Bus.	Bus.
1921	104	100
1922	101	95
1923	103	110
1924	80	95
1925	90	90
1926	120	123
1927	93	98

the year for which data were obtained in this study, were slightly below normal. The average yield obtained on the farms in this study in 1925 was 123.5 bushels, or about 37 percent higher than the state average for that year. The average yields obtained in the four principal commercial counties of Tennessee were about 40 percent higher in 1924 than the state average for that year.

Prices of sweetpotatoes: The prices received by farmers at Gleason, Tennessee, for sweetpotatoes, from 1921 to 1927, are shown in Table 38. These are prices received for sweetpotatoes hauled directly from the field to market in September and October. During the years for which data were obtained approximately the same prices prevailed in the Purchase as those shown for Tennessee. Usually considerably higher prices were received when the crop was stored and cured or when sold to the retail trade.

TABLE 38. Sweetpotatoes: Prices Per Bushel Received by Farmers at Gleason, Tennessee, 1921 to 1927. (September and October.)

Year	Price Per Bushel
	Cents
1921	60
1922	85
1923	50
1924	50
1925	60
1926	50
1927	45

Normal production requirements for sweetpotatoes, and assumed relative prices: Normal man labor, horse work, seed, fertilizer and other requirements for sweetpotatoes, and assumed relative prices for expense items and sweetpotatoes are shown in Table 39. Under usual conditions 75 hours of man labor and 53 hours of horse work are required for an acre of sweetpotatoes

prior to harvest and about 65 hours of man labor and 47 hours of horse work in harvesting and marketing. The requirements include 250 pounds of a home-mixed fertilizer consisting of nitrate of soda, superphosphate and muriate of potash. Three hundred pounds of a ready-mixed fertilizer containing not less than 2 percent of nitrogen, 8 percent of phosphoric acid and from 8 to 10 percent of potash would serve the same purpose but would probably cost slightly more per hundred pounds. It is expected that a considerable part of the application would remain in the soil for use by other crops in the rotation.

TABLE 39. Sweetpotatoes: Normal Production Requirements and Assumed Relative Prices.
(Acre basis, 130-bushel yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Dolls.
Man labor, hrs.	140	[2]
Horse work, hrs.	100	[2]
Seed, bus.	4	[2]
Complete fertilizer, lbs.[3]	250	1.75[4]
Manure, tons[5]	1.5	[2]
Corrosive sublimate, ozs.[6]	2	.15
Equipment expense, dolls.[7]	1.50	.....
Production, bus.	130	.50

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] This is a home-mixed fertilizer consisting of the following:

Superphosphate	1000 lbs. @ $1.10	$11.00
Nitrate of soda	212 lbs. @ 3.50	7.42
Muriate of potash	400 lbs. @ 2.50	10.00
	1612 lbs.	$28.42

This is approximately a 2-10-12 formula. A considerable part of the fertilizing value of the application is left in the soil for use by other crops. The amount shown is for one round of a rotation in which sweetpotatoes are followed by small grain, hay and pasture. [4] Price per 100 lbs. [5] For hotbed. [6] For treating seed. [7] See footnote 6, Table 4.

For the requirements indicated a yield of 130 bushels appears to be a conservative expectation. This yield is about one-

third larger than the average Kentucky yield from 1921 to 1927, but the data referred to above indicate that yields higher than state averages may be expected in commercial sections. Fifty cents per bushel is slightly below the average price of recent years, a period during which the prices in the principal commercial sections have been lower as compared with the prices of other products than during earlier years. However, at any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between sweetpotatoes and other enterprises: The seasonable distribution of man labor and horse work, together with the approximate beginning and ending dates for the principal operations, are shown in Figure 15. Land usually is prepared for sweetpotatoes and the crop transplanted before the same operations for tobacco. The cultivation period extends thru June and July. More man labor and horse work are required for harvesting than for any other operation. Sweetpotatoes usually are harvested during late September and October. While the requirements for sweetpotatoes early in the season conflict to some extent with important operations for tobacco, sweetpotatoes are harvested after the cutting and housing season for tobacco. Sweetpotatoes may be harvested after corn is cut and shocked. This operation may either precede or follow the seeding of small grain.

As compared with other crops sweetpotatoes grow well on the thinner upland soils of the Purchase. Consequently the crop is best adapted to the thin upland farms that are near a sweetpotato market or shipping point. Because of the bulkiness of the crop one should be reasonably sure of an easily accessible market before sweetpotatoes are planted. There are at present comparatively few regularly established sweetpotato markets in the Purchase. Farmers may aid in establishing markets by agreeing to grow sweetpotatoes regularly.

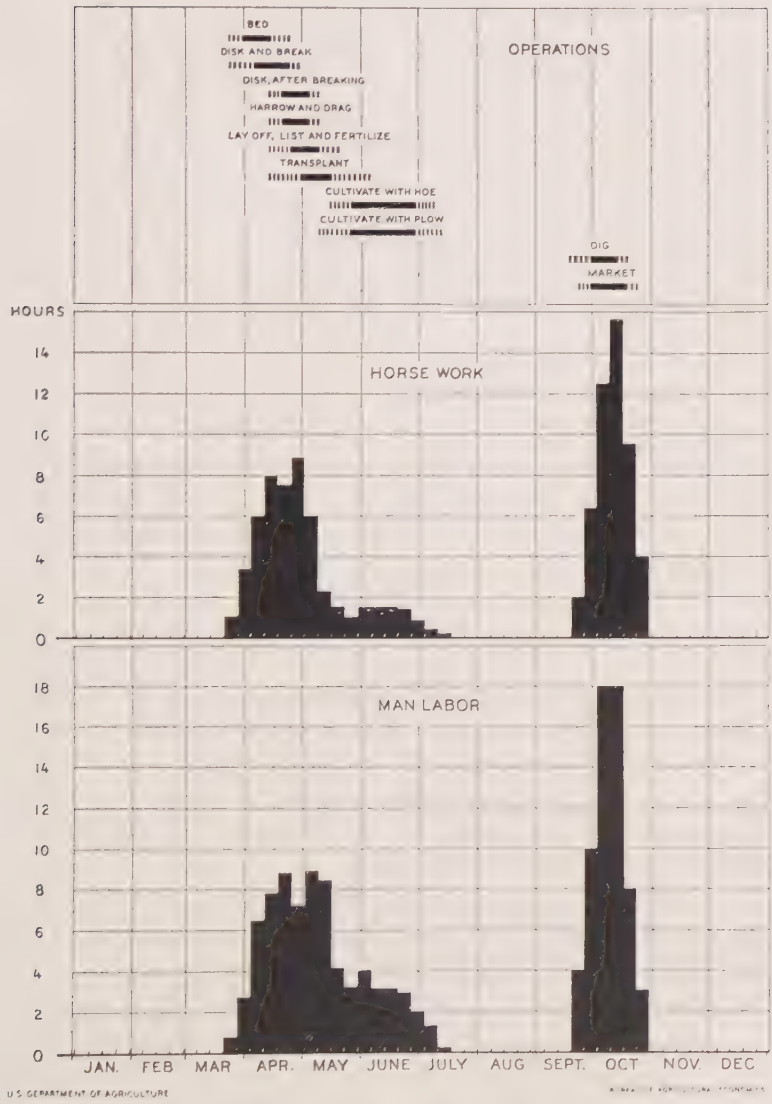

Fig. 15. Seetpotatoes: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

Tomatoes

Tomatoes have been grown commercially for canning in some sections of the Purchase for several years. Small acreages are grown each year near the larger towns for the retail trade, and in 1926 a small acreage was grown near Mayfield for early cold-pack shipments to northern markets. Due to the premium received for early tomatoes on these markets more intensive methods are used and more man labor is required than for canning tomatoes.

Normal production requirements for tomatoes, and assumed relative prices: Normal man labor, horse work, seed and other requirements for producing canning tomatoes, and assumed relative prices for tomatoes and expense items are shown in Table 40.

TABLE 40. Tomatoes for Canning: Normal Production Requirements and Assumed Relative Prices.
(Acre basis, 175-bu. yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Dolls.
Man labor, hrs.	160	[2]
Horse work, hrs.	120	[2]
Seed, ozs.	2	.25
Superphosphate, lbs.[3]	500	1.10[4]
Canvas, yds.[5]	18	.05
Equipment expense, dolls.[6]	1.50	....
Production, bus.	175	.40

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Usually two-thirds or more of the fertilizing value of the application is left in the soil for use by other crops. The amount shown is for one round of a rotation in which four crops are removed. [4] Price per 100 pounds. [5] Good quality canvas usually will last three years. Only one-third of the amount required will need to be bought each year. [6] See footnote 6, Table 4.

Approximately 160 hours of man labor and 120 hours of horse work are required to grow, harvest and market an acre of canning tomatoes yielding 175 bushels. Eighteen yards of plant bed or cold frame planted in drills usually will provide enough strong plants to set one acre at one drawing. Canvas costing

5 cents per yard will, under usual conditions, last 3 years, hence only one-third of the amount shown will need to be bought each year. The requirements include 500 pounds of superphosphate. Like other truck crops tomatoes respond well to liberal applications of manure. If manure is not used it will be necessary to use a complete fertilizer containing not less than 4 percent of nitrogen, 4 percent of potash, and from 10 to 16 percent of phosphoric acid. Results obtained in the section indicate that a yield of 175 bushels of marketable tomatoes is a conservative expectation for the requirements shown. From 1921 to 1927, 40 cents per bushel was the prevailing price received in the section for canning tomatoes. However, at any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between tomatoes and other enterprises: The seasonal distribution of man labor and horse work on tomatoes for canning, together with the beginning and ending dates for the principal operations are shown in Figure 16. Plant beds or cold frames for tomatoes are made a little later than plant beds for tobacco. The ground is prepared, the plants transplanted and the hoeing and cultivating are done about the same time as these operations for tobacco. The busy period for transplanting tomatoes usually follows the planting of corn but conflicts with harvesting strawberries and mixed clover hay. The picking and marketing of tomatoes conflicts with tobacco cutting and housing and soybean harvesting.

Tomatoes are bulky and should be grown within 5 or 6 miles of a canning factory or shipping point. While tomatoes require careful and timely attention during the harvesting season they are less exacting than strawberries. Best yields are obtained on fertile land that holds its moisture well.

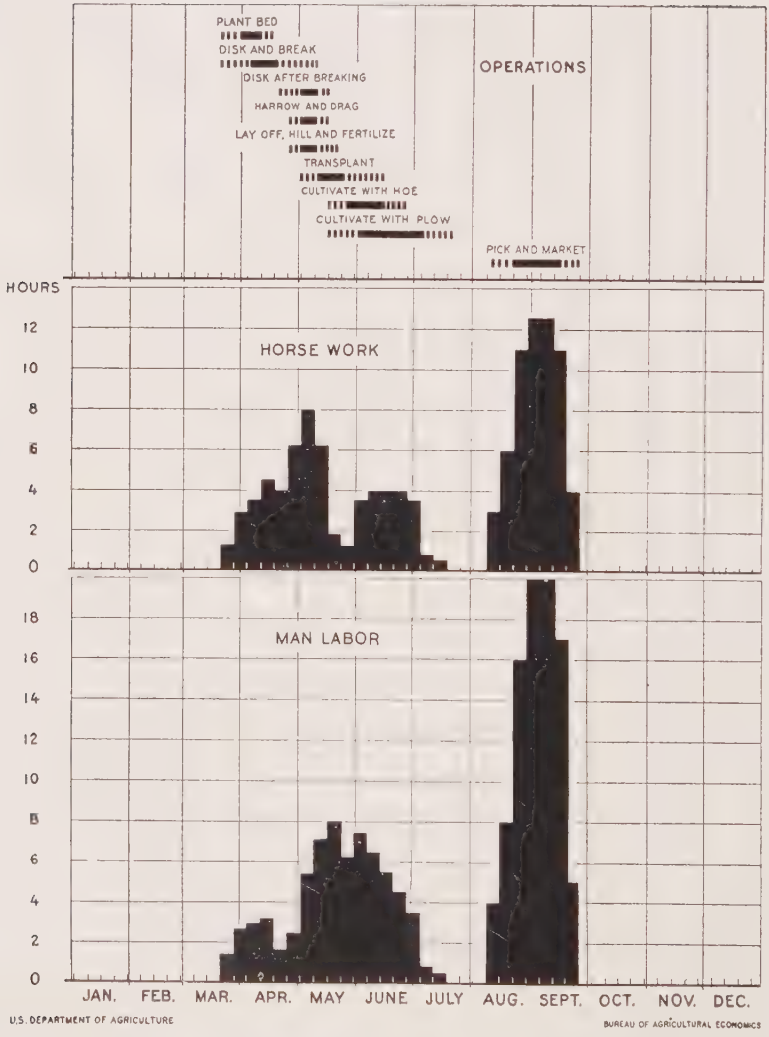

Fig. 16. Tomatoes for canning: Seasonal distribution of man labor and horse work and periods of important operations (See explanation under Fig. 2.).

Peaches[21]

Peaches have been grown commercially on a few farms in the Purchase and in other parts of western Kentucky for several years. They have been grown commercially in southern Illinois since 1900 and on a few farms even earlier. In the Carbondale district in southern Illinois, the peach crop has been profitable, even tho there have been a large number of crop failures because of frost damage. In the sections in Illinois north of the Carbondale district, the frost damage has been such as to make the growing of peaches hazardous. The failures in the Carbondale district are about three crops out of seven, and in the Centralia district about seven out of thirteen. The failures in the Ozark district of Arkansas are about one crop out of five, in the Highland district of Arkansas two out of fifteen, and in the Kingston district of Tennessee two out of fifteen. In the Purchase the indications are that the failures will not exceed one crop out of four. Aside from the crop failures, the yields obtained in western Kentucky compare favorably with those obtained in other commercial sections.

About four years are required from the time peach trees are planted before they come into bearing. The cost of trees and materials per acre during this period is approximately the same as the cost of plants and materials for establishing an acre of strawberries. The average man labor and horse work requirements per year for an acre during the period are slightly less than those for an acre of corn. After the trees come into bearing the man labor and horse work requirements each year prior to harvest are slightly more than those for an acre of corn. Generally a large part of the harvesting is done on a contract basis. The cost of fertilizer and spray materials and the cost of picking, packing and hauling to market including shipping containers usually ranges from 35 to 50 cents per bushel.

[21] Two mimeographed reports on peaches entitled "Production areas, competition, distribution, marketing and prices" and "Cost of developing orchards and cost of producing peaches" published by the Bureau of Agricultural Economics, United States Department of Agriculture, have been used freely in the preparation of this section.

Prices of peaches: The average prices received by growers per bushel basket of good merchantable Elbertas packed and delivered at local shipping points in the Kingston district of Tennessee, the Carbondale and Centralia districts of Illinois and the Highland and Ozark districts of Arkansas, from 1923 to 1927, are shown in Table 41. These prices are based on records of sales where available and, in other instances, on the estimates of shippers and market news quotations made available by the Federal Bureau of Agricultural Economics.

TABLE 41. Peaches, Elbertas: Average Prices Received by Growers Per Bushel,[1] 1923 to 1927.

Year	Tennessee[2]	Illinois[3]	Arkansas[4]
	Dolls.	Dolls.	Dolls.
1923	2.90	2.40	2.20
1924	1.65	1.79	1.45
1925	2.00	2.05	1.80
1926	.90	1.35	1.20
1927	2.50	2.25	1.75

[1] Packed and delivered at local shipping point in bushel baskets. [2] Kinston district. [3] Carbondale and Centralia districts. [4] Highland and Ozark districts.

Normal production requirements for peaches, and assumed relative prices: Normal man labor, horse work and material requirements for planting and caring for an acre of peach orchard to four years of age and assumed relative prices for trees and lime-sulfur are shown in Table 42. The man labor, horse work and materials for operating an acre of bearing peach orchard are shown in Table 43. Assumed relative prices for expense items and peaches and contract costs of harvesting also are shown. The requirements indicated in these two tables, including the contract harvesting costs, are based largely upon data obtained from experienced growers in the Centralia district of Illinois. The prices for expense items are the approximate average prices paid by growers in the commercial districts of Illinois, Tennessee and Arkansas. The prices for peaches are slightly below the average prices received by growers in Illinois and Tennessee from 1923 to 1927 but slightly above the prices received by grow-

ers in Arkansas during the same period. However, at any given time it will be necessary for farmers to make their own assumptions as to prices that will be applicable to conditions on their own farms. The 160-bushel yield is the approximate average yield produced by successful growers in the commercial sections of Illinois when crops are obtained. For the few orchards in the Purchase that have been in bearing for a period of years yields of 200 bushels per acre are common, and in 1926 and 1927 yields as high as 600 bushels per acre were obtained.

TABLE 42. Peaches: Normal Production Requirements for a Peach Orchard to Four Years of Age, and Assumed Relative Prices.
(Acre basis.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements:		Cents
Man labor		
1st year, hrs.	25	[2]
2nd year, hrs.	18	[2]
3rd year, hrs.	32	[2]
Total for 1st three years, hrs.	75	[2]
Horse work		
1st year, hrs.	10	[2]
2nd year, hrs.	12	[2]
3rd year, hrs.	35	[2]
Total 1st three years, hrs.	57	[2]
Trees	90	18
Spray materials, dormant		
Concentrated lime-sulfur, gals.	2	18
Equipment expense, dolls.[3]	3	.....

[1] For an explanation of this term see page 324. [2] Furnished by farm.
[3] See footnote 6, Table 4.

It is assumed that only three crops would be harvested every four years during the bearing life of the orchard. This is a lower percent of failures than is obtained in the Centralia and Carbondale districts but a higher percent than is obtained in Tennessee and Arkansas. The bearing life of the orchard in each of these districts is approximately 15 years.

TABLE 43. Peaches: Normal Production Requirements for a Bearing Orchard and Assumed Relative Prices.
(Acre basis, 160-bushel yield.)

	Amount	Assumed Relative Price[1] Per Unit
Production requirements, prior to harvest:		Dolls.
Man labor, hrs.	52	[2]
Horse work, hrs.	45	[2]
Spray material, dormant[3]		
Concentrated lime-sulfur, gals.	17	.18
Spray materials, summer[3]		
Arsenate of lead, lbs.	7	.25
Hydrated lime, lbs.	21	1.25[4]
Lime-sulfur, lbs.	70	.05
Nitrate of soda, lbs.	175	3.50[4]
Equipment expense, dolls.[5]	3.50	.....
Production requirements, harvesting:		
Man labor, hrs.[6]	30	[2]
Horse work, hrs.[6]	40	[2]
Picking (contract), bus.	160	.08
Packing (contract), bus.	160	.05
Shipping containers	160	.15
Equipment expense, dolls.[5]	1.00	.....
Production, bus.[7]	160	1.80

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] When bought in quantities spray materials usually may be obtained at prices lower than those indicated in this table. [4] Price per 100 pounds. [5] See footnote 6, Table 4. [6] Includes hauling baskets to the orchard, supervising picking and packing and hauling peaches to market. [7] Profitable bearing life is estimated at 15 years, with one crop failure every four years. The requirements shown are for a crop of 160 bushels. During years when there is a crop failure no summer spray would be used and the man labor and horse work requirements would be reduced about one-third.

Relation between peaches and other enterprises: Usually peach trees are set out late in the fall or in early spring when other farm work is not pressing. The cultivation is done during the cultivation season for other crops. Tobacco, strawberries or other low-growing cultivated crops may be grown between the peach trees during the first two or three seasons. After the trees come into bearing the pruning and a large part of the spraying are done during the winter and early spring. The harvesting season for most commercial varieties usually follows the busy

cultivation season for corn and tobacco and the harvesting season for strawberries and most hay crops, and precedes the cutting and housing season for tobacco.

Peaches are bulky and perishable and the crop requires careful and timely attention in pruning, spraying, thinning and harvesting. Peaches are relatively best adapted to farms within a reasonable distance of a shipping point, near which enough peaches are grown to ship in carlots, on which extra labor for picking and packing can be obtained and on which the farmers will give the crop careful and timely attention.

Apples

There have been a few commercial apple orchards in the Purchase for several years. The requirements and returns for apples are more similar to those for peaches than to those for any of the other crops for which data are presented.

The cost of planting an acre of apple orchard is approximately the same as that for an acre of peaches. Apples come into bearing 10 to 12 years after planting, whereas peaches come into bearing about 4 years after planting. However, three or more times as many apple crops usually are obtained from one planting as are obtained from peaches.

The man labor, horse work and material requirements per year are not greatly different for young apple and peach orchards before they come into bearing. These requirements are slightly larger for apple orchards than for peach orchards, after they come into bearing. The yield per acre of apples is usually from one and one-half to two times as large per year as the yield of peaches.

Cotton

Cotton was not grown extensively in the Purchase prior to 1923 except in Fulton and Hickman Counties. The most rapid increase in acreage took place in 1924 and 1925. The increase was due largely to the relatively high prices of cotton in 1923 and 1924 as compared with prices of dark tobacco, together with

yields being obtained in Fulton and Hickman Counties. Cotton gins have been built in a number of towns, providing convenient markets for cotton which is now being grown on a few farms in practically every part of this region.

Approximately 100 hours of man labor and 30 hours of horse work are required for an acre of cotton. The labor for preparing the land, planting and cultivating cotton comes at about the same time as the labor for preparing the land, transplanting and cultivating tobacco. Cotton picking starts about the same time as tobacco cutting but extends over a longer period. Cotton offers no opportunity for profitable employment during the winter season. Fertilizer requirements are about the same as for tobacco. However, cotton is generally grown on much thinner soil than tobacco. The lighter ridge soils are better adapted to the growing of cotton than the heavy soils, since they warm up earlier in the spring which makes for early germination and growth. This results in earlier blooming and bolling and more mature bolls per stalk.

Results obtained on the Mayfield experiment field and on farms in the section indicate that on well drained, warm soils receiving a liberal application of mixed fertilizer the chances are about as good for a yield of 750 pounds of seed cotton as for 950 pounds of tobacco.

Cotton is less exacting than strawberries or tobacco. That is, in growing cotton there is no period comparable to the harvesting season for strawberries or the cutting, housing and curing season for tobacco when so much depends upon careful and timely attention. Cotton is less bulky and perishable than sweetpotatoes, strawberries or other fruit crops and, like tobacco, is not at a great disadvantage when grown a comparatively long distance from the market. However, it is generally not advisable to grow it if it must be hauled more than 12 or 15 miles. Cotton is relatively best adapted to those farms with well-drained upland soils that are outside the commercial strawberry and sweetpotato areas and within a reasonable distance of a cotton gin.

Dairy Cows

Dairying has been rapidly expanding in the Purchase in recent years. On many farms dairy products are the most important source of income. Dairy cattle require large amounts of pasturage and hay crops. The dairy cattle of the Purchase utilize more pasturage and, next to work stock, consume more hay than any other class of livestock. Good pastures and legume hays are essential to the economical production of dairy products.

Feed, man labor, horse work and materials used for dairy cows: The feed, man labor, horse work and other costs used for dairy cows on farms on which detailed records were kept are shown in Table 44. The farms are arranged in the order of the butterfat production per cow, beginning with the highest. The production ranged from 105.8 to 334.7 pounds per cow. This includes butterfat sold, that contained in milk, cream, and butter used in the home, and that contained in milk fed to calves after they were seven days of age.

The most important causes of the variations in production were the quality of the cows, the kinds and amounts of feeds used and the kind of pastures provided. Practically all the cows were grade Jerseys, but their productive capacity differed greatly. Highest production was obtained on farm 14, and the next highest on farm 23. On both farms good grade Jerseys were kept, and the pasturage was fair to good. However, too much purchased feed was used for the most economical production to be obtained. On farm 14 the cost of purchased feed was about 12 cents for each pound of butterfat produced and on farm 23, 14 cents. When these costs are added to the market value of the feeds grown and fed to the cows the total feed charge for each pound of butterfat produced on these two farms is from 25 to 30 cents.

On farms 21, 22 and 6 good production was obtained largely from the use of home-grown feeds and pasturage. The cost of

TABLE 44. Dairy Cows: Feed, Man Labor, Horse Work and Other Costs Used and Butterfat Produced, Per Head. Route Farms 1924-26, Inclusive.

Farm No.	Size of Herd[4]	Butterfat Production	Concentrates				Roughages					Pasture	Man Labor[5]	Horse Work[5]	Miscellaneous Costs[6]
			Corn	Bran and Shorts	Cotton-seed Meal	Other Concentrates	Soybean Hay	Other Hay	Silage	Stover	Straw				
	Cows	Lbs.	Bus.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Days	Hrs.	Hrs.	Dolls.
14[2]	5.8	334.7	14.5	1451.3	153.0	521.1	2096.1	1473 3	...	... .	96.6	219.4	171.5	10.4	.66
23[1]	6.4	251.0	8.0	1254.7	427.3	115.2	953.1	343.8	6718.8	... ...	103.1	194.8	143.4	1.4	.....
21[1]	9.7	244.9	31.5	9.8	67.0	.....	1368.7	141.8	... ..	402.1	204.1	238.4	152.9	13.2	.43
22[1]	3.7	236.1	14.6	....	63.5	193.8	1248.6	459.5	... .	486.5	... ...	275.7	156.1	14.9	.26
6[3]	5.0	234.7	20.2	6.7	172.8	60.4	1021.9	625.5	... ...	861.6	... .	237.4	128.9	13.1	.03
20[2]	6.4	230.5	5.1	1123.5	500.6	325.4	208.5	38.8	9218.2	434.8	459.6	183.3	163.2	14.1	3.09
5[3]	3.4	220.2	24.7	413.8	58.4	126.6	691.3	1306.2	...	58.4	... ...	295.5	228.9	23.0	.63
4[3]	2.1	196.7	30.0	655.3	271.0	9.4	1755.7	3002.4	... ...	145.6	1018.0	215.8	209.0	22.5[7]	.23
18[2]	7.2	194.2	17.6	69.8	48.3	25.3	773.5	2181.6	...	69.1	... ...	289.6	136.2	6.0	.81
17[3]	6.9	187.3	15.5	9.6	137.6	12.5	791.9	613.2	4505.1	254.7	... ...	231.9	150.3	18.4	.07
3[1]	2.9	186.4	23.2	189.6	.....	...	... .	2255.2	...	...	448.3	287.1	150.2	16.0	...
12[1]	4.0	183.0	7.2	400.0	... .	95.0	...	1400.0	... .	...	... ...	207.9	174.7	10.6	1.25
15[1]	7.7	169.2	16.9	103.9	80.5	439.0	1655.8	...	...	129.9	... ..	267.4	109.2	12.3	2.40
10[1]	12.9	161.6	2.7	503.9	217.0	...	.....	438.0	5542.6	...	... ...	235.4	108.4	6.2	.18
19[2]	3.6	157.2	38.1	863.9	296.6	234.6	171.0	355.2	...	408.3	82.8	264.6	161.1	33.8	.90
2[3]	7.7	154.7	5.7	100.2	78.4	51.7	232.5	630.6	4278.8	43.1	125.0	250.8	153.5	5.6	.17
8[3]	8.0	154.6	14.0	257.9	111.9	96.9	862.9	645.7	... .	431.9	295.8	273.9	160.3	12.0	.24
1[1]	4.0	154.2	12.9	75.0	25.0	.....	...	1998.8	...	1300.0	... ..	250.6	156.8	6.9	.30
11[2]	7.8	141.5	15.8	103.7	161.8	189.1	847.0	796.5	.....	1141.0	.....	233.8	149.8	11.0	.04
7[2]	3.3	130.8	19.5	7.6	30.3	30.3	.....	762.1	.....	189.4	.....	270.9	81.5	2.3	.....
16[2]	6.8	127.7	18.2	151.1	85.4	51.1	335.8	306.6	...	656.9	... .	221.8	130.1	13.9	.17
13[3]	2.2	119.4	19.0	264.2	25.4	7.5	186.6	1141.8	74.6[8]	388.0	.....	215.5	106.2	14.7	.....
9[1]	3.0	105.8	16.0	158.3	10.0	.....	.....	1483.3	.....	666.7	.....	253.0	161.1	.7	.....
Av.	5.5	185.8	15.7	322.6	146.6	113.3	705.1	828.1	1760.0	351.0	114.9	243.8	149.4	12.4	.52

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Includes all cows of milking age. [5] Marketing products excluded. [6] Includes veterinary, medicines and salt. [7] Used 0.8 hour tractor work for grinding feed. [8] Sweetpotatoes.

purchased feeds on none of these three farms exceeded 2 cents for each pound of butterfat produced. Including the market value of all feeds grown, except pasture, the total charge for feeds on these farms was between 12 and 15 cents per pound of butterfat. These low feed costs were due largely to the fact that in each case good pasturage was provided and effectively utilized.

On farm 21 most of the cows freshened in March and April. During this time they were fed corn, soybean hay or mixed clover hay, sorghum and corn stover. On April 15 the cows were put on redtop and clover pasture and a light grain ration continued. They were kept on this and Japan clover pasture until November. An abundance of pasturage was available during this period. During most of November and December they were kept on soybean and cornstalk pasture. Soybean hay was used to supplement the pasture during March and December and continued during January and February. The grain ration was increased during the winter months and a small amount of cottonseed meal added. About 80 percent of the total production of the year was obtained during the period from April to November. Even greater economy in production might have been obtained if a ration with slightly more hay and less corn had been used during the winter period.

On farm 22 most of the cows freshened in the fall. During the winter the cows were fed corn, cottonseed meal, soybean and Japan clover hay and sorghum fodder. They were put on rye pasture about March 15 and shifted to Japan clover and grass pasture about May 1. The pasture was supplemented with a light ration of crushed corn and cottonseed meal during April, May, June, October, and November. No feed other than pasture was used during July, August and September. In November and December the pasture consisted of standing corn from which the ears had been harvested and a second crop of clover and timothy. Good pasturage was available most of the time from March to December. The butterfat production was distributed fairly evenly thruout the year.

On farm 6 data for the dairy herd are available for three years. Most of the cows on this farm freshened in the fall. During the winter they were fed corn, cottonseed meal, cowpea and soybean hay, Japan clover hay, sorghum and corn stover. An abundance of redtop and Japan clover pasture was available each year. In one year rye was pastured in March and April. Generally corn and cottonseed meal were fed during the early part of the pasture season and a light ration of corn continued except during two or three months when the pasturage was best. On this farm production was fairly evenly distributed thruout the year.

Farms 20, 4 and 19 were among those on which uneconomical feeding practices were followed. On farm 20 little legume hay was used and practically all the protein feeds were purchased. Altho a balanced ration was fed its cost was high. On farm 4 an attempt was made to get high production from mediocre cows. A heavy grain ration was fed during the entire year. More hay was fed in winter than the cows utilized. On farm 19 an expensive ration was used, corn, bran, cottonseed meal and commercial dairy feeds being practically the only feeds used. Little hay or other roughage was fed and as a result feed costs were high and production low.

Small amounts of hay, particularly legumes, poor pastures and poor cows are common causes of low production. On most of the farms with low production enough concentrates were fed to have resulted in good production, if legume hays and good pastures had been provided.

The man labor used per cow ranged from 81.5 to 228.9 hours and the horse work from .7 to 33.8 hours. These differences were due largely to the size of the herd and to the feeding and pasture practices followed. Generally smaller amounts of man labor and horse work were used per cow in large herds than in small herds. Heavy feeding and the use of bulky feeds also made for large labor requirements on some farms.

Feed prices: Bran and shorts[22] and cottonseed meal were the principal purchased feeds used for dairy cows. The prices

[22] Bran and shorts consists of wheat mixed feed obtained in the usual process of commercial milling. Locally the feed is called "bran."

paid by farmers at Paducah, from 1921 to 1927, the average prices paid by Kentucky farmers (Kentucky farm price) from 1921 to 1925 and the prices paid on the farms in this study for these feeds are shown in Table 45.

TABLE 45. Feeds: Prices Per 100 Pounds Paid by Farmers for Bran and Shorts, Cottonseed Meal and Linseed Oil Meal, 1921 to 1927.

Year	Bran and Shorts			Cottonseed Meal			Linseed Oil Meal
	Kentucky Farm Prices	Retail Prices Paid at Paducah	Prices Paid on Route Farms	Kentucky Farm Prices	Retail Prices Paid at Paducah	Prices Paid on Route Farms	Retail Prices Paid at Paducah
	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.	Dolls.
1921	1.66	1.75	.....	2.14	2.00	.....	3.00
1922	1.62	1.60	.....	2.45	2.50	.....	3.00
1923	1.82	1.75	.....	2.64	2.50	.....	3.20
1924	1.84	1.75	1.76	2.65	2.50	2.35	3.00
1925	1.93	1.85	1.83	2.30	2.20	2.15	3.00
1926	[1]	1.60	1.67	[1]	1.75	1.65	2.90
1927	[1]	1.75	.....	[1]	2.00	.....	2.90

[1] Data not available.

Butterfat and butter prices: The Chicago prices of 92-score butter, the average prices received by Kentucky farmers for butterfat (Kentucky farm price) from 1921 to 1927 and the prices received on the farms in this study are shown in Table 46. The

TABLE 46. Butterfat and Butter: Prices Per Pound, 1921 to 1927.

Year	Chicago, 92-Score Butter	Kentucky Farm Price for Butterfat	Prices Received on Route Farms for Butterfat
	Cents	Cents	Cents
1921	42	36	....
1922	39	34	....
1923	46	43	....
1924	41	41	39
1925	44	42	40
1926	43	40	38
1927	46	43	....

prices paid for whole milk at the condensary at Mayfield during 1927 ranged from 50 to 90 cents per hundred pounds higher than the butterfat in the milk would have brought at prevailing prices for butterfat. A charge of 25 cents per 100 pounds was made when the milk was hauled on a contract basis, leaving a net difference of 25 to 65 cents per hundred pounds.

Normal production requirements for dairy cows, and assumed relative prices: The data for dairy cows presented above, similar data for other dairy herds in the section, and experimental data showing the results when different rations were fed have been used in working out normal feed and other requirements for dairy cows and assumed relative prices for feeds and dairy products. Such requirements and price relations for cows producing 5000 pounds of four and one-half percent milk are shown in Table 47. Requirements are shown for three different feed combinations, each of which is similar to those being used on some of the more successful farms in the section at the present time. These requirements include 2 acres of good pasture per cow. If good pastures are not available more grain and hay will be needed. By using good pastures many farmers in the section have been able to get slightly larger production than is indicated from similar amounts of feeds.

Combination 1 provides for feeding 7 pounds of concentrates consisting of 8 parts of ear corn or crushed corn-and-cob meal, 2 parts of bran and shorts and one part of cottonseed meal, with 16 pounds of soybean and mixed clover hay and 6 pounds of corn stover per day for 156 days and 2.7 pounds of ear corn or crushed corn-and-cob meal per day for 150 days. During the remainder of the year, the cow will be given no feed other than pasture.

Combination 2 provides for feeding 7.7 pounds of concentrates consisting of 8 parts of ear corn or crushed corn-and-cob meal, 1 part of bran and shorts and 3 parts of cottonseed meal, with 16 pounds of mixed clover hay per day for 156 days and 2.7 pounds of ear corn or crushed corn-and-cob meal per day for 150 days.

TABLE 47. Dairy Cows: Normal Production Requirements Per Head, and Assumed Relative Prices.
(Cow producing 5,000 lbs. of 4½% milk.)

	Amounts Per Cow Per Year			Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	Combination 3	
Production requirements:				Dolls.
Corn, bus.	16	16	16	[2]
Bran and shorts, lbs.	200	100	.....	1.80[3]
Cottonseed meal, lbs.	100	300	200	2.20[3]
Soybean hay, lbs.	1,500	.....	1,800	[2]
Mixed clover hay, lbs.	1,000	2,500	.....	[2]
Corn stover, lbs.	1,000	1,000	.....	[2]
Silage, lbs.	.....	.....	4,500	[2]
Pasture, acres[4]	2	2	2	[2]
Man labor, hrs.	150	150	150	[2]
Horse work, hrs.	10	10	10	[2]
Building expense, dolls.[5]	3.00	3.00	3.00	.....
Equipment expense, dolls.[5]	1.50	1.50	1.50	.....
Miscellaneous costs, dolls.[6]	2.50	2.50	2.50	.....
Production:				
Milk, lbs. or	5,000	5,000	5,000	2.10[3]
Butterfat, lbs.	225	225	225	.38

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Pasturage for one cow for 240 days. [5] Does not include interest and taxes. If these items were included the charges would be about twice those shown for buildings and 50 per cent larger than those shown for equipment. [6] Includes veterinary, medicine, salt and breeding fees.

Combination 3 provides for feeding 6.4 pounds of concentrates consisting of 8 parts of ear corn or crushed corn-and-cob meal and 2 parts of cottonseed meal, with 11.5 pounds of soybean hay per day for 156 days and 30 pounds of silage per day for 150 days of the same period and 2.7 pounds of ear corn or crushed corn-and-cob meal per day for 150 days.

According to established feeding standards the above combinations have approximately the same feeding values. The man labor and horse work requirements are for feeding, milking, hauling purchased feeds, separating the milk and caring for the separator, or cooling and preparing the milk for shipment on a truck. Expenses for buildings and equipment include depreciation, repairs and insurance but do not include interest and taxes.

The miscellaneous costs include veterinary, medicine, salt and breeding fees.

The price for bran and shorts is slightly above the average price prevailing from 1921 to 1927. The price for cottonseed meal is approximately the average price prevailing during that period. The price for butterfat is slightly below the average price received from 1923 to 1927. The usual contract charge of 25 cents per hundred pounds for hauling has been deducted from the price for whole milk, and a net price shown. At any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Normal production requirements for cows producing 6000 pounds of milk have been worked out in a manner similar to that described for 5000-pound cows. These are shown in Table 48.

TABLE 48. Dairy Cows: Normal Production Requirements Per Head, and Assumed Relative Prices.
(Cow producing 6,000 pounds of 4½% milk.)

	Amounts Per Cow Per Year			Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	Combination 3	
Production requirements:				Dolls.
Corn, bus.	19	19	19	[2]
Bran and shorts, lbs.	250	150	.....	1.80[3]
Cottonseed meal, lbs.	125	325	250	2.20[3]
Soybean hay, lbs.	1,500	.....	2,000	[2]
Mixed clover hay, lbs.	1,200	2,800	.....	[2]
Corn stover, lbs.	1,000	1,000	.....	[2]
Silage, lbs.	.....	.....	4,500	[2]
Pasture, acres[4]	2	2	2	[2]
Man labor, hrs.	160	160	160	[2]
Horse work, hrs.	10	10	10	[2]
Building expense, dolls.[5]	3.00	3.00	3.00	.....
Equipment expense, dolls.[5]	1.50	1.50	1.50	.....
Miscl. costs, dolls.[6]	2.50	2.50	2.50	.....
Production:				
Milk, lbs. or	6,000	6,000	6,000	2.10[3]
Butterfat, lbs.	270	270	270	.38

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Pasturage for one cow for 240 days. [5] See footnote 5, Table 47. [6] Includes veterinary, medicine, salt and breeding fees.

Combinations 1, 2 and 3 shown here are similar to combinations 1, 2 and 3 shown in Table 47 for 5000-pound cows, the different feeds being increased in proportion to the increased production.

Relation between dairy cows and other enterprises: The seasonal distribution of man labor for dairy cows are shown in Figure 17. The heaviest man labor requirements are during the winter season, the winter requirements being much heavier when the cows freshen in the fall.

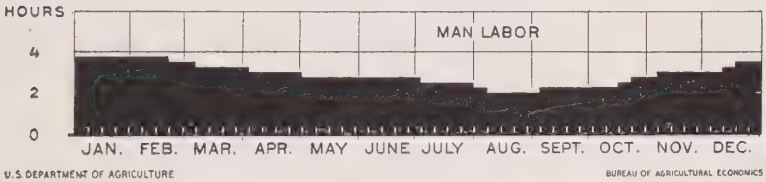

Fig. 17. Dairy cows: Seasonal distribution of man labor, for one cow producing 5,000 pounds of milk.

Dairy cows fit in well with the other livestock and crops of the Purchase. Manure, when handled judiciously, may be effectively used in improving the soil so that better yields may be obtained. If butterfat is sold the skim-milk may be used in balancing the grain rations for hogs and poultry. Dairy cows utilize roughages such as corn stover and straw to good advantage. The heaviest man labor and horse work requirements are during seasons of the year when most other farm work is least pressing.

Practically all soil building programs for the Purchase include the growing of legumes. Legume hays usually are utilized more effectively by dairy cattle than by any other kind of livestock. As a rule a sufficient number of dairy cows should be kept on every farm to supply plenty of dairy products for the home. Commercial dairying is best adapted to those upland farms that are reasonably accessible to a market for dairy products and on which legumes and pastures are needed for the maintenance or improvement of the fertility of the soil. If dairy cows are to be handled profitably an abundance of good pasturage must be provided and legume hays and most of the concentrates should be grown on the farm.

Young Dairy Cattle

Some young dairy cattle are kept on most farms in the Purchase. Data showing the feeds, man labor, horse work and other expense items used for these young cattle were obtained from farms included in this study. However, each herd contained cattle of different ages ranging from veal calves to heifers two years of age and bulls about ready for the breeding herd and usually all, except calves receiving milk, were fed together. Because of the mixed nature of this group and the difficulty of measuring production the data are not presented. However, data from individual farms have been analyzed and used in working out normal requirements for the different classes of young dairy cattle. Normal data are presented for the following groups: (1) veal calves; (2) dairy calves from the time of birth to one year of age; and (3) dairy heifers from one to two years of age.

Normal production requirements for veal calves and assumed relative prices: The whole milk, man labor and horse work for keeping a veal calf from birth until it weighs 140 pounds are shown in Table 49. It is expected that the calf will

TABLE 49. Veal Calves: Normal Production Requirements Per Head, and Assumed Relative Prices.
(140 lbs. each.)

	Amounts Per Head	Assumed Relative Price[1] Per Unit
Production requirements:		Cents
Whole milk, lbs.	480	[2]
Man labor, hrs.	5	[2]
Horse work, hrs.	1	[2]
Production, lbs.	140	8

[1] For an explanation of this term see page 324. [2] Furnished by farm.

be sold when it is about six weeks old. Milk received during the first week is not included. The man labor and horse work are for feeding and caring for the calf and marketing. The price shown is approximately the average price received in the section for good veals from 1922 to 1927. However, at any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Normal production requirements for dairy calves from birth to one year of age: Normal feed, man labor, horse work and other requirements for keeping a dairy calf from birth to one year of age are shown in Table 50. Requirements for two different combinations of feeds are shown, one when whole milk is used and the other when skim-milk is largely used. Milk received during the first week is not included. The requirements include one-half acre of good pasture.

TABLE 50. Dairy Calves: Normal Production Requirements Per Head, and Assumed Relative Prices.
(From birth to one year of age.)

	Amounts Per Head Per Year		Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	
Production requirements:			Dolls.
Corn, bus.	.....	1	[2]
Bran and shorts, lbs.	.....	30	1.80[3]
Linseed meal, lbs.	.....	10	3.00[3]
Skim-milk, lbs.	1,200	.....	[2]
Whole milk, lbs.	50	480	[2]
Legume hay, lbs.	200	200	[2]
Pasture, acres[4]	.5	.5	[2]
Man labor, hrs.	10	10	[2]
Horse work, hrs.	1	1	[2]
Building expense, cents[5]	30	30	.....
Miscl. costs, cents[6]	10	10	.....

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Pasturage for one calf for 180 days. [5] See footnote 5, Table 47. [6] Includes veterinary, medicine and salt.

Normal production requirements for dairy heifers from one to two years of age: Normal feed, man labor, horse work and other requirements for a dairy calf from one to two years of age are shown in Table 51. One feed combination is shown including silage and one without silage. In each case the requirements shown include 1.5 acres of good pasture.

TABLE 51. Dairy Heifers: Normal Production Requirements Per Head, and Assumed Relative Prices.
(From one to two years of age.)

	Amounts Per Head Per Year		Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	
Production requirements:			Dolls.
Corn, bus.	2	2	[2]
Bran and short, lbs.	100	100	1.80[3]
Legume hay, lbs.[4]	1,000	500	[2]
Silage, lbs.	.....	1,500	[2]
Pasture, acres[5]	1.5	1.5	[2]
Man labor, hrs.	10	10	[2]
Horse work, hrs.	1	1	[2]
Building expense, cents[6]	50	50	.....
Miscl. costs, cents[7]	20	20	.....

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Corn stover may be substituted for a part of the hay, two pounds for one, during late fall and early winter. [5] Pasturage for one heifer for 240 days. [6] See footnote 5, Table 47. [7] Includes veterinary, medicine and salt.

Sheep

Sheep are a minor source of income on a few farms in practically every section of the Purchase except in river bottoms. The numbers of sheep have been decreasing in recent years, due in part to the lack of protection from dogs, inadequate fences and the increase in dairy cows. Sheep require relatively large amounts of pasturage and hay crops. Legume hays, and pastures fenced so the flock can be changed frequently to fields free from parasites are essential to the economical handling of sheep.

Feed, man labor, horse work and materials used for sheep: The feed, man labor, horse work, and other costs used and the resulting production of lambs and wool are shown in Table 52. The farms are arranged in the order of live weight of lambs pro-

duced per ewe, beginning with the highest. All the data are for the year beginning October 1, 1926, and ending September 30, 1927.

TABLE 52. Sheep: Feed, Man Labor, Horse Work and Other Costs Used and Lambs and Wool Produced, Per head. Farms Studied, 1926-27.

Farm No.	Size of Flock	Production		Corn	Other Concentrates	Hay	Silage	Pasture	Man Labor	Horse Work	Miscellaneous Costs[2]
		Lambs	Wool								
	Ewes	Lbs.	Lbs.	Bus.	Lbs.	Lbs.	Lbs.	Days	Hrs.	Hrs.	Dolls.
64	18.5	124.3	9.9	3.0	.....	173.0	.....	246.5	13.1	.5	.01
65	21.0	89.5	6.9	1.1	43.8	78.6	.....	230.1	5.3	.....	.....
66	21.0	87.6	7.1	1.4	27.6	152.4	.....	215.0	5.2	1.8	[1]
23	16.1	71.7	6.9	1.3	16.3	68.3	.....	205.5	3.6	1.6	.01
67	8.5	70.6	7.5	.9	.....	176.5	.....	219.9	4.4	.5	.....
68	141.5	55.7	7.3	1.0	7.1	282.7	.....	222.6	5.1	.8	.....
69	28.5	52.4	4.9	2.0	.....	157.9	.....	240.0	8.1	1.5	.01
70	20.0	31.0	6.9	.4	3.8	120.0	100.0	201.3	9.7	.....	.01
Av.	34.4	64.7	7.1	1.2	10.3	209.2	7.3	223.2	6.2	.5	[1]

[1] Less than one-half cent per head. [2] Includes dips, drenching materials, salt and twine.

The lamb production ranged from 31 to 124.3 pounds per ewe. The most important causes of the variation in production were the breeding of the ram, kind of ewes, attention given at lambing time and the feeds and pastures used. About one-half of the flocks consisted largely of good grade native ewes while the remainder consisted largely of ewes of inferior quality.

The highest production was obtained on farm 64 and second highest on farm 65. Small flocks of good grade ewes were kept on both farms. For several years the old, less desirable ewes have been culled out each year and replaced with the best ewe lambs. Unusual care and attention were given the flocks at lambing time on both farms. The percentage of lambs lost was smallest on farm 64 and next to the smallest on farm 65. On farm 64 red clover hay was fed from December to March, inclusive, after which the ewes and lambs were turned on rye pasture. They

stayed on rye until the latter part of April, when they were turned on redtop and Japan clover pasture. An abundance of pasture was available thruout the growing season.

On farm 65 the ewes were fed a grain mixture consisting of corn, oats, and bran and shorts, and soybean and cowpea hay during the winter period. The lambs were born in late February and March. The flock was turned on redtop and Japan clover pasture on April 1. An abundance of pasture was available during the entire grazing season and the sheep were changed from field to field in order to keep down parasites. The lambs were fed a light grain ration of corn and bran and shorts for about two months before they were marketed.

On farm 66, on which the third largest production per ewe was obtained, the third smallest percentage of lambs were lost. The flock consisted of good grade Hampshire ewes, and a purebred Hampshire ram was used. The ewes were fed a grain mixture of corn, oats, bran and shorts during the winter season. About one-fourth pound of grain mixture per day was fed the lambs for thirty days prior to marketing. The grain mixture consisted of equal parts by weight of corn and bran and shorts.

The smallest lamb production per ewe was obtained on farm 70. The flock consisted mostly of good grade ewes and purebred rams were used. The ewes were bred late, received little feed during the winter and were poorly cared for at lambing time; as a result about one-half of the lambs were lost. The lambs were fed no grain. Only slightly better results were obtained on other farms breeding late and using similar feeding practices.

The man labor used per head ranged from 3.6 to 13.1 hours and the horse work from less than one-half hour to 1.8 hours per head. In addition to labor used in caring for the breeding flock this includes man labor and horse work for marketing lambs and wool. The differences were due largely to attention given the flock at lambing time, convenience of the pasture fields and sheds, and the size of the flock. On a few farms large amounts of labor were used in protecting the flocks from dogs.

The average amounts of wool clipped per ewe ranged from 4.9 to 9.9 pounds. Differences in the weight of fleeces were due largely to the size and breeding of the ewes. The heavier and the lighter fleeces were of about the same quality. Farm 64, on which the lamb production was largest, had the largest wool clip per head.

Feed prices: Bran and shorts, oats, cottonseed meal, and linseed meal were the principal purchased feeds used for sheep. Prices that have prevailed in the section for bran and shorts and linseed meal have already been shown (See Table 45). In recent years the prices paid by farmers for oats have ranged from 60 to 70 cents per bushel during the winter season.

Lamb and wool prices: The average Kentucky farm prices for lambs and wool from 1921 to 1927 are shown in Table 53. In 1927 the farmers of the Purchase received from 1 to 2 cents per pound less for both lambs and wool than the prices for that year shown in the table.

TABLE 53. Sheep: Kentucky Farm Prices for Lambs and Wool, 1921 to 1927.

Year	Lambs, Price Per 100 Lbs.	Wool, Price Per Lb.
	Dollars	Cents
1921	7.48	18.8
1922	8.91	26.8
1923	10.03	37.0
1924	10.22	38.8
1925	12.08	42.3
1926	12.03	39.0
1927	12.07	37.0

Normal production requirements for sheep, and assumed relative prices: The data presented above, together with experimental data showing results when different rations were fed have been used in working out normal feed, labor and other requirements for sheep and assumed relative prices for expense items and products to be sold. These data are shown in Table 54. Feeding requirements per head for three different feed com-

binations are shown, each of which is similar to some of those being used by the better farmers in the section at the present time. These requirements include .4 acres of good pasture per mature head. Normally the pasture season for sheep extends from about March 15 to November 15, rye or oats being used for late fall and early spring pasture. If good pasturage is not available more grain and hay will be required. These requirements also provide for feeding legume hay from November 15 to March 15, and grain from the middle of January to the last of April. Grain is provided for feeding the lambs from the time they are two weeks of age until marketed.

TABLE 54. Sheep: Normal Production Requirements Per Mature Head, and Assumed Relative Prices.
(1.1 lambs, 75 lbs. each.)

	Amounts Per Year			Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	Combination 3	
Production requirements:				Dolls.
Corn, bus.	1.5	1.12	.50	[2]
Oats, bus.	.....	.75	.75	.65
Bran and shorts, lbs.	.....	.....	24	1.80[3]
Linseed oil meal, lbs.[4]	2.5	.....	8	3.00[3]
Silage, lbs.	.....	.....	400	[2]
Legume hay, lbs.[5]	325	325	200	[2]
Pasture, acres[6]	.4	.4	.4	[2]
Man labor, hrs.	6	6	6	[2]
Horse work, hrs.	1.5	1.5	1.5	[2]
Building expense, cents[7]	30	30	30	.....
Miscl. costs, dolls.[8]	1	1	1	.....
Production[9]:				
Lambs, lbs.	70	70	70	.10
Old sheep, lbs.	11	11	11	.03
Wool, lbs.	7	7	7	.36

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Old process, pea size. [5] Either alfalfa, mixed clover, soybean, Japan clover or a mixture of these hays may be used. Corn stover or other non-leguminous roughages may be substituted for a part of the hay early in winter. [6] Pasturage for one mature sheep for 250 days. [7] Includes equipment. See footnote 5, Table 47. [8] Includes dips, drenching material, salt and twine. [9] Lambs to replace one-sixth of the flock would be kept each year. With a production of 82.5 pounds of lamb per mature head, this leaves 70 pounds of lamb for sale. Allowing for a 5.5 percent death loss, two-thirds of the replaced ewes would be available for sale. At 100 pounds each, the sales would be 11 pounds of old sheep per mature head.

Combination 1 includes requirements for feeding the ewe 2.5 pounds of legume hay per day for about 130 days and two-thirds pound of corn per day for 100 days, with 22.5 pounds of concentrates, consisting of 8 parts corn and one part linseed meal, for fattening the lambs. This is 20 pounds per lamb to be fed over a period of about 75 days.

Combination 2 differs from combination 1 in that oats are substituted for the linseed meal and a part of the corn, making a grain mixture of 3 parts corn and one part oats by weight. In combination 3 the grain mixture consists of 3 parts corn, 3 parts oats, 3 parts bran and shorts, and one part linseed meal, by weight. Silage is substituted for a part of the legume hay. Enough of each is included to feed 3 pounds of silage and 1.5 pounds of hay per day for 130 days.

Relation between sheep and other enterprises: The seasonal distribution of man labor on sheep is shown in Figure 18. The heaviest man labor requirements for sheep come during the lambing season in February and March when other farm work is not pressing. Considerable man labor is also required at shearing time in early May. A small amount of horse work is required in late June, July or early August in marketing lambs; otherwise very little horse work is needed.

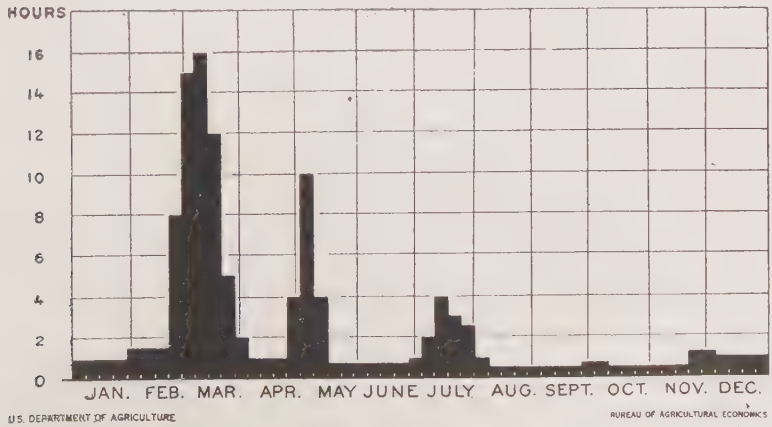

Fig. 18. Sheep: Seasonal distribution of man labor, for 10 mature head.

Sheep are good scavengers and may be used to advantage in cleaning up weeds and bushes in the pastures, lanes and fence rows. A small flock of 15 to 25 ewes usually will get a large part of its feed from material which would otherwise be wasted. However, small amounts of legume hay and grain are essential during the winter and early spring.

Many upland farms having pasturage that is not being utilized can advantageously keep a small flock of sheep. Since their feed consists largely of pasture and legume hay they fit in well with the soil building program, especially on farms located some distance from markets for dairy products. Cattle do not graze well after sheep and usually it is not advisable to keep sheep and dairy cows on the same farm unelss separate pastures are provided.

Hogs

Hogs are kept on practically every farm in the Purchase. They are a major source of income on a few farms and a minor source on most farms.

Feed, man labor, horse work and materials used for hogs: The feed, man labor, horse work and other costs used in producing 100 pounds of pork are shown in Table 55. The farms are arranged in the order of the total pounds of concentrates used per 100 pounds of pork, beginning with the lowest. The total concentrates used ranged from 294.6 to 865.2 pounds. The amounts of corn used ranged from 4.8 to 15.2 bushels, and the amounts of protein feeds used ranged from 9.5 gallons of skim-milk and no tankage to 91.9 gallons of skim-milk and 0.9 pounds of tankage.

On some farms the production was too small for the requirement data to be significant, since hogs usually pick up some feed not reported, such as grain following cattle or grain left in the field in harvesting. Of the farms on which considerable quantities of pork were produced, and for which data were obtained during the entire three-year period, farms 6 and 5 were among those on which economical production was obtained.

TABLE 55. Hogs: Feed, Man Labor, Horse Work and Other Costs Used in Producing 100 Pounds of Pork. Route Farms, 1924-26, Inclusive.

Farm No.	Pork Produced	Corn	Tankage	Other Concentrates	Total Concentrates	Skim-milk	Pasture	Man Labor	Horse Work	Miscellaneous Costs[4]
	Cwt.	Bus.	Lbs.	Lbs.	Lbs.	Gals.	Days[5]	Hrs.	Hrs.	Dols.
23[1]	50.1	4.8	.7	22.5	294.8	30.9	45.5	2.3	.7	.01
6[3]	43.6	5.3	1.4	18.4	317.5	51.2	53.0	5.8	1.4	.02
21[1]	46.2	5.4	.9	17.5	321.7	91.9	15.5	4.0	.3	.01
2[3]	14.4	5.8	.....	1.4	328.5	72.7	47.5	2.5	1.8	.22
20[1]	69.9	5.5	12.9	13.6	336.0	34.1	18.0	4.2	1.5	.07
5[3]	51.1	5.7	13.6	12.1	345.6	3.2	40.0	5.7	1.0	.02
17[3]	42.7	5.9	.....	18.0	350.6	19.0	9.5	2.9	1.5	.....
1[1]	10.6	6.5	.....	.....	364.5	86.6	.....	16.2	.9	.....
15[1]	34.7	5.0	.....	86.6	366.1	79.7	67.5	3.2	1.0	.....
4[3]	23.0	6.3	5.1	10.3	368.3	17.1	43.0	7.0	1.2	.01
14[2]	51.0	6.8	.....	.5	379.8	46.2	57.5	3.5	.7	.06
3[1]	14.5	6.8	.....	.....	380.2	25.2	70.0	10.5	.6	.....
22[1]	30.4	6.8	.....	6.6	389.9	67.0	55.5	6.7	1.0	.....
19[2]	86.1	5.8	8.1	56.6	391.9	23.6	44.5	5.8	1.4	.03
16[2]	39.5	6.3	.....	43.2	395.2	28.8	47.5	4.6	.8	.....
18[2]	17.0	7.2	1.3	.....	404.8	55.2	23.0	5.1	.6	.....
10[1]	50.6	4.8	.....	146.4	414.5	64.1	41.0	4.4	.8	.02
11[2]	38.5	7.0	.....	36.4	427.2	48.4	42.5	6.2	.4	.....
12[1]	19.7	8.6	.....	.....	479.2	9.5	89.0	6.3	1.0	.....
8[3]	22.7	8.6	.7	.....	482.0	52.7	71.5	10.1	.9	.01
7[2]	38.1	9.5	.....	20.7	551.1	12.6	81.5	6.2	2.0	.....
13[2]	14.1	13.4	3.5	32.2	787.3	24.7	86.5	13.5	1.4	.02
9[1]	11.6	15.2	.....	15.5	865.2	14.6	87.5	13.9	.2	.....
Av.	35.7	6.5	3.5	26.3	391.9	35.8	45.0	5.5	1.1	.02

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Includes veterinary, medicines, oil and minerals. [5] Days per mature hog.

On farm 6 an average of 13.5 pigs were saved per sow per year during the three-year period. Except pigs lost at farrowing time, only one hog died during the entire period. The hogs were kept in a thrifty, healthy condition at all times. In 1924 the hogs were on rye pasture during February, March and April, and on redtop and Japan clover pasture from May to September, inclusive. In 1925 and 1926 they were on redtop, Japan clover and mixed clover pasture from April to September, inclusive. During two years corn and soybeans were hogged down,

the production being estimated and included in the amount of feed reported. During October and November of the other year the hogs obtained some waste grain from the corn field after the corn was snapped.

On farm 5 an average of 11.3 pigs were saved per sow per year during the three-year period. Rye or oat pasture was available during March and April and red clover, Japan clover and redtop pasturage was utilized from May to September, inclusive, each year. Corn and soybeans were hogged down each year. There were practically no death losses on this farm, except pigs at farrowing time. In addition to the feeds reported small amounts of waste products were utilized by hogs on each of these farms.

The most important causes of large feed requirements per 100 pounds of pork were inadequate pastures, small litters, and large death losses. Good pastures, proper feeding and careful attention at farrowing time are essential for economical hog production.

Prices of tankage: The average prices paid by farmers for tankage at Paducah, from 1921 to 1927, are shown in Table 56. The prices paid on route farms are also shown.

TABLE 56. Tankage: Prices Per 100 Pounds Paid by Farmers, 1921 to 1927.

Year	Retail Prices Paid at Paducah	Prices Paid on Route Farms
	Dolls.	Dolls.
1921	3.50	.....
1922	3.60	.....
1923	3.80	.....
1924	3.50	3.80
1925	3.50	3.86
1926	4.00	4.01
1927	3.80	.....

Prices of hogs: The average prices for common to choice light hogs at East St. Louis and the average Kentucky farm prices for hogs from 1921 to 1927 are shown in Table 57. The prices received on the route farms during 1924, 1925 and 1926 are also shown.

TABLE 57. Hogs: Prices Per 100 Pounds, 1921 to 1927.

Year	East St. Louis (Common to Choice Lights)	Kentucky Farm Price	Prices Received on Route Farms
	Dolls.	Dolls.	Dolls.
1921	9.06	8.03	.....
1922	9.76	8.62	.....
1923	7.81	7.11	.....
1924	8.30	7.47	7.43
1925	12.34	11.30	11.56
1926	13.29	12.38	11.71
1927	10.63	10.14	.....

Normal production requirements for hogs, and assumed relative prices: The feed, man labor, horse work and other requirements to produce 100 pounds of pork under usual conditions in the section are shown in Table 58. The approximate requirements are indicated when two different feed combinations are used, one when skim-milk is fed with corn, and the other when tankage is fed with corn. Slightly less corn is required when it is fed with skim-milk than when fed with tankage. The requirements shown for each combination include pasturage and

TABLE 58. Hogs: Normal Production Requirements for 100 Pounds of Pork. (Including Requirements for Keeping Sow.)

	Amounts Used		Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	
Production requirements:			Dolls.
Corn, bus.	6.5	7.0	[2]
Tankage, lbs.	.....	20	3.90[3]
Skim-milk, lbs.	275	.....	[2]
Pasture, acres[4]	.1	.1	[2]
Man labor, hrs.	5	5	[2]
Horse work, hrs.	1	1	[2]
Equipment expense, cents[5]	10	10	.....
Miscl. costs, cents[6]	14	14	.....

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Pasture for one mature hog for 45 days. [5] Includes building expense. See footnote 5, Table 47. [6] Includes breeding fees, veterinary, medicine, oil and minerals.

assume that the hogs will be kept in healthy condition and reasonably good care taken at farrowing time. The requirements may be lower than those indicated, when exceptionally good pasturage is provided or when unusually large litters are saved or when comparatively large amounts of waste products are utilized. The hours of man labor and horse work shown include requirements for feeding, and hauling to market.

Similar feed, man labor, horse work and other requirements for keeping a sow for one year and feeding eight pigs to 200 pounds each (producing 1600 pounds of pork) are shown in Table 59. The data shown in this table were obtained by multiplying the data as to the requirements for 100 pounds of pork in the preceding table by sixteen.

TABLE 59. Hogs: Normal Production Requirements Per Sow and Pigs, and Assumed Relative Prices.
(8 pigs, 200 lbs. each.)

	Amounts Per Year		Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	
Production requirements:			Dolls.
Corn, bus.	104	112	[2]
Tankage, lbs.	.....	320	3.90[3]
Skim-milk, lbs.	4,400	.....	[2]
Pasture, acres[4]	1.5	1.5	[2]
Man labor, hrs.	80	80	[2]
Horse work, hrs.	16	16	[2]
Equipment expense, dolls.[5]	1.60	1.60	.....
Miscl. costs, dolls.[6]	2.25	2.25	.....
Production:			
Pork, live weight, lbs.	1,600	1,600	8.75[3]

[1] For an explanation of this term see page 324. [2] Furnished by farm. [3] Price per 100 pounds. [4] Pasturage for 9 mature hogs for 80 days. [5] Includes building expense. See footnote 5, Table 47. [6] Includes breeding fees, veterinary, medicine, oil and minerals.

Relation between hogs and other enterprises: The seasonal distribution of man labor on hogs is shown in Figure 19. The man labor requirements for hogs are distributed fairly evenly thruout the year.

Hogs are relatively best adapted to those farms on which there are large acreages suitable for growing corn and on which good corn yields are obtained. Practically every farm should produce its own meat supply. On farms reasonably well adapted to growing corn and on which dairy cattle are kept and butterfat sold, it will usually be advisable to produce a surplus of pork for sale, using skim-milk along with corn. On most upland farms on which low crop yields are obtained other classes of livestock that utilize hay and pasture to better advantage than hogs have a more important place.

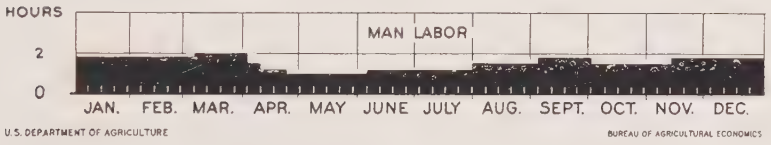

Fig. 19. Hogs: Seasonal distribution of man labor, for one sow and 8 pigs.

Poultry[23]

Chickens are kept on practically every farm in the Purchase. Most of the poultry and poultry products produced in the region come from small farm flocks of 30 to 100 birds. Since 1920, poultry and poultry products have increased in importance, and more care and attention are being given the flocks than formerly. Many farmers have increased their flocks, provided better housing facilities and improved their feeding practices. This has resulted in a considerable increase in the sale of poultry products. Poultry require relatively large amounts of grain and protein concentrates or skim-milk and small amounts of roughage. Plenty of home-grown grains, fresh water, and good range thruout the growing season are esesntial to the economical production of poultry products.

Feed, man labor, horse work and materials used for poultry: The feed, man labor, horse work and other expense items used

[23] Poultry as used in this section refers only to chickens.

and the production of poultry and eggs obtained are shown in Table 60. The farms are arranged in the order of egg production per bird, beginning with the highest. The production of eggs ranged from 3.4 dozen to 13 dozen. This includes those sold, used in the home and set. Pullets and cockerels on hand after November first are counted in arriving at the yearly average size of flock. Feeds and labor for the flock include that used by the young birds. The miscellaneous costs include expenditures for such items as medicines and disinfectants but do not include custom hatching or money spent for fuel used in the operation of incubators and brooders.

The principal causes of variations in production were the breeding of flocks and amount of culling done, kinds and amounts of feed fed, earliness of pullets, housing facilities, and sanitation and freedom from disease. Each of the four highest producing flocks was made up entirely of purebred birds that had been selected for high egg production. These four flocks were fed rations of grain and skim-milk supplemented with a small amount of high protein concentrates. All these flocks were kept as demonstration flocks for the Poultry Department of the Kentucky Agricultural Experiment Station and received more feed than is usually fed to a farm flock. They also produced more eggs and poultry than ordinary farm flocks.

On farm 14, on which the fifth highest production was obtained, only 56.9 pounds of concentrates and 3.6 gallons of skim-milk were fed per bird as compared with 153.8 pounds of concentrates and 10.9 gallons of milk on farm 12. The production on farm 14 was 8.6 dozen eggs and 12.5 pounds of poultry per bird. The concentrates fed consisted largely of home-grown grain. This is a small farm flock of 27.4 birds and some feed was picked up on the range. In addition to the feed shown, the flock had alfalfa and clover pasture thruout the growing season. The birds were purebred and had been culled for egg production but were not forced for high records. They were housed in a serviceable farm poultry house that provided adequate room and protection. Care and attention were given to keep the flock

TABLE 60. Chickens: Feed,* Man Labor, Horse Work and Other Costs Used and Eggs and Poultry Produced, Per Bird. Route Farms, 1924-26, Inclusive.

Farm No.	Size of Flock	Production		Corn	Other Grains	Bran and Shorts	Laying Mash	Tankage	Chick Feed	Milk	Oyster Shell	Man Labor	Horse Work	Miscellaneous Costs[4]
		Eggs	Poultry											
	Birds	Dozs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Gals.	Lbs.	Hrs.	Hrs.	Dolls.
12[1]	95.0	13.0	9.1	37.0	43.2	15.6	40.0	.....	18.0	10.9	8.2	4.3	1.1	.....
23[1]	76.5	12.6	14.0	37.0	36.4	31.4	19.9	1.6	7.4	11.6	3.9[5]	6.4	.1	.....
5[3]	87.6	10.0	11.1	45.5	9.2	34.0	1.2	1.1	4.9	7.3	3.8	4.6	1.1	.....
2[3]	64.0	9.6	11.1	50.1	5.2	14.8	5.1	3.6	3.1	10.8	2.7	3.4	.4	.04
14[2]	27.4	8.6	12.5	45.0	.....	6.4	.....	.....	5.5	3.6	.4	3.2	.1	.....
3[1]	29.0	7.5	15.5	25.1	.....	.....	10.3	.....	25.5	2.2	6.9	11.2	1.2	.03
13[3]	42.4	7.4	11.1	44.6	.5	6.4	.....	.....	6.7	2.9	.....	4.4	.5	.....
16[2]	53.5	7.1	4.8	15.6	.....	.....	.....	.....	1.0	1.7	.....	1.8	.1	.....
19[2]	43.5	6.9	6.7	13.8	20.1	.....	.6	.....	1.8	.....	.....	3.2	.1	.01
4[3]	53.7	6.1	9.9	46.6	4.7	9.3	1.2	2.7	.3	5.5	.5	3.6	.2	.02
20[1]	35.0	6.0	11.8	8.7	14.1	6.6[6]	2.9	.4	1.7	6.8	.....	4.4	.6	.05
21[1]	73.7	5.5	17.6	50.7	2.6	6.9[7]	1.4	.3	1.7	10.2	.....	2.8	.4	.01
17[3]	57.2	5.5	8.4	15.7	3.1	1.7	.1	.5	.4	1.1	.....	3.8	.6	.02
10[1]	144.0	5.3	7.0	31.1	2.4	45.5	.....	2.8	6.0	12.9	2.1	4.6	.2	.01
22[1]	47.5	5.2	8.6	36.5	.....	6.3	.....	.2	1.2	4.3	.....	3.3	.....	.....
7[2]	68.1	4.7	5.6	38.6	.....	.....	.....	.....	.....	2.2	.....	2.8	.1	.01
15[1]	35.0	4.7	4.3	3.2	.9	.....	.....	.....	.....	.....	.....	3.8	.1	.....
9[1]	70.0	4.6	7.3	9.6	2.6	.....	5.7	.....	1.4	.....	.....	1.8	.....	.....
8[3]	37.9	4.5	5.1	15.6	3.8	.4	.....	.....	.....	2.4	.....	2.5	.1	.01
6[3]	36.6	3.9	6.6	40.2	.....	.9	.....	.2	1.1	1.8	.....	4.9	.5	.03
18[2]	43.0	3.8	6.8	22.5	5.9	12.7	.....	1.2	6.4	6.3	2.9	6.9	.....	.02
1[1]	40.0	3.5	7.2	14.7	2.0	.....	.....	1.2[8]	.1	2.0	.....	4.1	.2	.....
11[2]	44.2	3.4	8.6	13.8	5.4	.....	.....	.....	.....	1.3	.....	2.6	.4	.01
Av.	54.5	6.8	9.0	32.5	6.9	11.7	3.3	1.0	3.5	5.3	1.5	3.9	.4	.01

*On three farms straw was used as follows: Farm 12, 7.5 lbs.; farm 23, 18.8 lbs.; farm 21, 3.2 lbs. [1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Includes medicines and disinfectants. [5] Includes 1.3 lbs. charcoal. [6] Includes 1.6 lbs. Japan clover hay leaves. [7] Includes 2.6 lbs. ground alfalfa hay. [8] Solid buttermilk.

free from disease. Special efforts were made to have well-grown pullets for fall and winter egg production.

On farm 11, on which the smallest egg production per bird was obtained, very little corn or other grain was fed the laying flock, most of the grain used being fed to young chicks. An average of 8.6 pounds of poultry per mature bird was produced on this farm. Only 1.3 gallons of skim-milk were fed per year. The housing facilities were not adequate and the flock was kept in uncomfortable and unsanitary quarters thruout the winter. Chicks were all hatched late in the spring and very little culling was done. On each of the other three farms on which the average production was less than four dozen eggs per bird the flocks were made up almost entirely of mongrels which in each case were handled in a manner somewhat similar to that on farm 11.

The man labor used per bird ranged from 1.8 to 11.2 hours and the horse work from zero to 1.2 hours. The variations in amounts of man labor used were due largely to the way in which the chicks were hatched and brooded and the conveniences in the poultry yard. Generally less man labor was required when chicks were hatched with hens than when incubators and brooders were used. The highest horse work requirements were on farms where no auto was available for hauling feeds and marketing the products.

Feed prices: The prices that have prevailed for bran and shorts[24] in recent years have previously been shown (See Table 45). The prices paid by farmers for meat scrap and oyster shell from 1921 to 1927 are shown in Table 61. For the past few years good quality commercial baby chick feed has been sold for about five cents per pound.

Prices of poultry products: The average prices received by Kentucky farmers for chickens (Kentucky farm price) and the prices paid to farmers at Mayfield for hens and fryers from 1921 to 1927 and the average prices received on route farms for hens and fryers are shown in Table 62. The prices for fryers are those received from April to August, inclusive. After September 1, prices for young birds are about the same as for hens. The

[24] See footnote 22, page 398.

TABLE 61. Meat Scrap and Oyster Shell: Prices Per 100 Pounds Paid by Farmers, 1921 to 1927.

Year	Retail Prices Paid at Paducah	
	Meat Scrap	Oyster Shell
	Dolls.	Dolls.
1921	5.50	1.40
1922	4.75	1.10
1923	4.50	1.00
1924	4.50	1.00
1925	4.25	1.00
1926	4.75	.90
1927	4.75	.90

high average prices received in 1924 for young birds sold on the route farms were due to the large number of sales made in April and early May when prices usually are high.

TABLE 62. Chickens: Prices Per Pound Prevailing in the Purchase, 1921 to 1927.

Year	Kentucky Farm Prices for Chickens	Hens		Fryers[1]	
		Prices Received by Farmers at Mayfield	Prices Received on Route Farms	Prices Received by Farmers at Mayfield	Prices Received on Route Farms
	Cents	Cents	Cents	Cents	Cents
1921	19	[2]	....	[2]	....
1922	18	17	....	[2]	....
1923	18	17	....	27	....
1924	18	18	19	28	30[3]
1925	20	19	19	28	24
1926	21	20	20	27	25
1927	20	19	....	23	....

[1] Average prices per pound, April to August, inclusive. [2] Data not available. [3] Most of these were sold in April and May.

The average prices received by Kentucky farmers for eggs (Kentucky farm price) from 1921 to 1927, the prices paid to farmers at Mayfield from 1922 to 1927 and the average prices received on route farms are shown in Table 63.

TABLE 63. Eggs: Prices Per Dozen Prevailing in the Purchase, 1921 to 1927.

Year	Kentucky Farm Price	Prices Received by Farmers at Mayfield	Prices Received on Route Farms
	Cents	Cents	Cents
1921	29	[1]	....
1922	25	23	....
1923	27	26	....
1924	28	27	28
1925	31	28	28
1926	29	27	27
1927	26	25	....

[1] Data not available.

Normal production requirements for chickens, and assumed relative prices: Normal feed, man labor, horse work and other requirements for chickens are shown in Table 64. The requirements shown are for heavy breeds[25] producing 9 dozen eggs and 8 pounds of live poultry per bird. Assumed relative prices for feeds, hens, fryers and eggs also are shown. Requirements for three different feed combinations are included, each of which is similar to those used on some of the more successful farms in the section at present. They provide the necessary feed when the hens are kept in small flocks with free range under ordinary farm conditions. If the birds are confined to a dry lot or are on restricted range more feed will be necessary.

Combination 1 provides 56 pounds of grain and 100 pounds of skim-milk for feeding each mature bird, and two pounds of baby chick feed, 14 pounds of grain and 30 pounds of skim-milk for growing the young birds. Combination 2 is similar to combination 1 except that mash is substituted for a part of the grain and skim-milk. In combination 3 no skim-milk is provided, the protein requirement being met entirely by adding to the amount of meat scrap in the mash.

The man labor and horse work requirements provide for feeding and caring for the flock, and marketing the products.

[25] This includes such breeds as Plymouth Rock, Rhode Island Red, Wyandotte, Orpington, etc.

If very small flocks are kept or if a large amount of artificial hatching and brooding is done more labor will be needed. The miscellaneous costs include medicines and disinfectants but do not include a charge for artificial hatching and brooding.

TABLE 64. Poultry: Normal Production Requirements Per Mature Bird, and Assumed Relative Prices.
(Heavy breeds, 9 doz. eggs and 8 lbs. poultry.)

	Amounts Per Year			Assumed Relative Price[1] Per Unit
	Combination 1	Combination 2	Combination 3	
Production requirements:				Dolls.
Corn, grain, bus.[2]	1¼	1	1	[3]
Corn, ground, lbs.	.....	10	10	.20[4]
Bran and shorts, lbs.	.....	15	20	1.80[5]
Meat scrap, lbs.	.....	1	5	4.50[5]
Oyster shell, lbs.[6]	4	4	4	1.00[5]
Skim-milk, lbs.	130	80	.....	[3]
Baby chick feed, lbs.[7]	2	2	2	5.00[5]
Man labor, hrs.	4	4	4	[3]
Horse work, hrs.	.3	.3	.3	[3]
Building expense, cents[8]	20	20	20	.....
Miscl. costs, cents[9]	1	1	1	.....
Production:				
Eggs, dozs.	9	9	9	.25
Fryers, lbs.	4	4	4	.26
Hens, lbs.	4	4	4	.18

[1] For an explanation of this term see page 324. [2] Wheat may be substituted pound for pound if it is no higher in price than corn. [3] Furnished by farm. [4] Cost per 100 lbs. for grinding corn furnished by farm. [5] Price per 100 pounds. [6] Crushed limestone is equally effective and may be substituted for oyster shell if available. [7] Provides for a starting period of 4 weeks. Commercial chick starter should not be fed in connection with milk. If milk is available the chicks can be started on about two gallons of milk and two pounds of a home-mixed mash consisting of 70 parts ground yellow corn, 20 parts shorts, 5 parts bone meal, 4 parts ground limestone and one part salt, all by weight. No grain will be needed with the mash. [8] Includes equipment. See footnote 5, Table 47. [9] Includes medicine and disinfectants, but does not include cost of fuel for incubator and brooder.

The price for meat scrap is slightly below the average price paid from 1921 to 1927. The prices for other expense items and the prices for products sold are approximately the averages of prices prevailing in the section in recent years. However, at

any given time it will be necessary for farmers to make their own assumptions as to the prices that will be applicable to conditions on their own farms.

Relation between poultry and other enterprises: The seasonal distribution of man labor on poultry under ordinary farm conditions is shown in Figure 20. The largest amount of labor is required in March and April and usually may be done when it is not possible to do field work. Since a large amount of labor on poultry is of such a nature that it can be done by women and children it interferes very little with other enterprises on the farm. Poultry utilize non-marketable feeds much of which would otherwise be wasted and offer profitable employment for labor during the winter season.

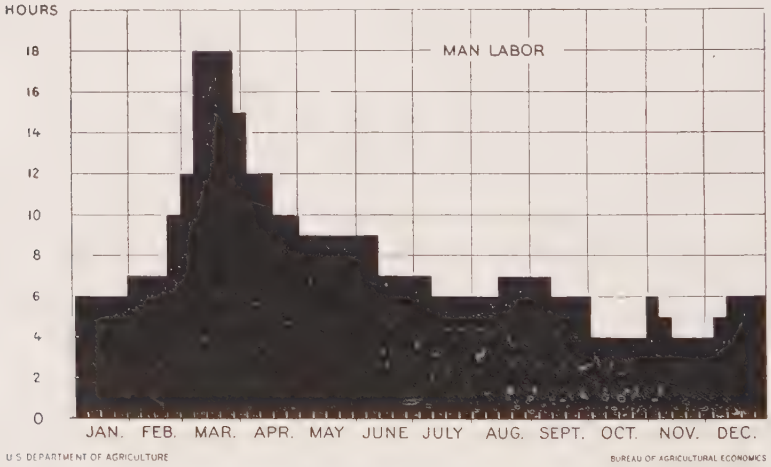

Fig. 20. Poultry: Seasonal distribution of man labor, for 100 mature birds.

As a rule enough poultry should be kept to supply sufficient products for the home. On most farms there should be a surplus for sale. Poultry may well be an important source of income on those farms producing suitable feeds and on which careful attention is given to the production of winter eggs and early fryers. Chickens are especially well adapted to those farms on which there is a surplus of skim-milk.

Work Stock

The work stock of the Purchase are fed about one-half of all the feed produced. Hogs get more corn than the work horses, on a few bottom farms, and dairy cattle more hay than work horses, on some upland farms, but on most farms the work horses get as much feed as all other classes of livestock combined, or more.

Feed, man labor and materials used for work stock: The feed, man labor and materials used for work stock are shown in Table 65. The farms are listed on the basis of hours worked per horse, beginning with the highest. All animals of working age kept for farm work were included. About three-fifths of the total number were mules, one-fifth mares and one-fifth geldings. The feeds used for young horse stock were reported separately but since they include only a few animals are not presented.

The average amounts of work per horse ranged from 586.6 to 1520.3 hours. Often more horses were kept than were needed to do the farm work. In some cases one or more of the horses were worked less than a week during the entire year. The work was poorly planned on many farms, so that more horses were used during the busy seasons than would have been needed if the work had been more carefully planned.

The amount of grain fed per horse ranged from 23.2 to 58.9 bushels of corn or the equivalent in other grains. The roughage used ranged from 1810.1 pounds of hay and 256.9 pounds of stover to 5289.4 pounds of hay, 558.4 pounds of stover and 345.2 pounds of straw. In general, the horses that were worked most were fed most. However, on some farms the horses were worked a comparatively large number of hours and the amounts of feed used were comparatively small, whereas on other farms the reverse was true.

On farm 5 the horses were worked a large number of hours and only small amounts of feed were used. The work was carefully planned and practically all the fencing, manure hauling, hauling barn wood and work of similar nature was done before time for preparing the land, planting and cultivating the crops.

TABLE 65. Work Stock: Feed, Man Labor, Horse Work and Other Costs and Hours Worked, Per Horse. Route Farms, 1924-26, Inclusive.

Farm No.	No. Head	Work Per Horse	Corn	Hay	Stover	Straw	Pasture	Man Labor	Horse Work	Miscellaneous Costs[4]
		Hrs.	Bus.	Lbs.	Lbs.	Lbs.	Days	Hrs.	Hrs.	Dolls.
12[1]	3.0	1,520.3	58.9[5]	4,563.3	.....	.....	36.6	71.9	18.4	4.45
3[1]	3.1	1,217.7	47.2	4,411.3	.....	225.8	118.5	75.1	19.4	1.85
5[3]	3.4	1,080.8	24.5[6]	2,929.9	640.8	.....	175.6	44.1	4.6	1.08
19[2]	6.8	1,063.7	50.5[7]	5,289.4	558.4[8]	345.2	127.2	46.4	21.2	2.32
22[1]	3.0	1,057.6	45.7	3,080.0	600.0	.....	229.0	74.7	20.9	1.47
16[2]	6.2	1,053.5	40.8[6]	1,561.0	1,290.2	.....	129.5	44.8	14.9	1.68
1[1]	2.5	1,030.4	37.2	3,160.0	320.0	.....	192.3	85.7	35.4	3.36
23[1]	3.1	1,013.9	42.9[9]	2,238.7	.....	83.9	107.1	47.4	4.1	1.77
17[3]	5.1	1,013.0	43.5[6]	2,459.4	1,152.5[8]	.....	116.6	33.0	5.4	2.16
6[3]	3.9	973.6	39.0	2,198.7	2,299.8	.....	150.4	66.5	25.5	2.29
11[2]	4.9	966.5	32.5	3,620.9	1,015.3	.....	95.1	39.9	4.0	.50
21[1]	4.2	937.6	47.7[9]	2,785.0	1,035.7	50.0	121.4	43.9	4.5	.56
9[1]	4.9	892.7	33.4[6]	4,887.8	734.7	.....	146.7	57.8	13.9	.93
14[2]	3.0	873.7	26.9[6]	2,447.5	.....	.....	164.9	37.1	.5	.49
2[3]	4.3	871.6	29.8	2,173.2	124.0	550.4	103.1	15.5	1.4	.87
4[3]	3.2	822.6	46.2	3,886.1	541.2	.....	.....	60.5	11.5	2.31
8[3]	6.7	816.0	31.0	2,943.0	360.1	31.2	168.2	35.9	2.0	.90
10[1]	5.0	811.4	36.0[6]	3,059.0	.....	.....	121.8	43.6	6.6	.95
13[3]	4.1	778.6	46.0	2,575.4	344.3	.....	141.1	56.7	10.1	1.14
7[2]	5.4	683.3	37.0	1,810.1	256.9	.....	249.3	41.1	2.3	1.38
15[1]	3.9	636.7	28.6	2,817.9	307.7	.....	218.1	32.6	1.5	3.55
18[2]	4.5	586.6	23.2[6]	2,096.7	27.8	.....	205.7	30.1	5.4	1.25
Av.	4.4	911.7	37.5[6]	2,907.0	579.4[8]	73.0	141.5	44.6	9.0	1.53

[1] Records covering one year. [2] Records covering two years. [3] Records covering three years. [4] Includes shoeing, veterinary services, medicines and salt. [5] Includes 106.7 lbs. oats and 66.6 lbs. mill feeds. [6] Includes small amount of other concentrates. [7] Includes 916.8 lbs. oats and 38.3 lbs. mill feeds. [8] Includes small amount of green roughage. [9] Includes 289 lbs. oats.

Good pasturage was available during the growing season and the horses were kept on pasture when they were not used. No more horses were kept than were needed to do the farm work.

On farm 13 large amounts of feed were used and the horses worked a small number of hours. The crops grown necessitated a large amount of work in May and June and small amounts during the remainder of the year. Besides, very little horse work was required by the productive livestock. During most of the year the pasturage was of poor quality, and even when the work stock were on pasture it was usually necessary to feed some grain.

An over-supply of work stock is a common cause of loss on many Purchase farms. Most of these extra horses have passed their prime and are decreasing in value. There is no surer way to absorb profits than to keep old horses not needed for farm work and use feed for them that could be turned to productive uses.

Normal production requirements for work stock: Normal feed, man labor, and other requirements for work stock are shown in Table 66. These requirements are for 900 to 1000 pound horses or mules working from 900 to 1100 hours during the year. The requirements include 1.25 acres of good pasture. If the horses are worked more than is indicated, or if they are kept off pasture during the entire year more feed will be required.

TABLE 66. Work Stock: Normal Production Requirements Per Head. (950-pound horse or mule working 1,000 hours.)

	Amounts Per Head Per Year
Production requirements:	
Corn, bus.	40
Mixed hay, lbs.[1]	3,500
Pasture, acres	1.25
Man labor, hrs.	45
Horse work, hrs.	5
Building expense, dolls.[2]	3.50
Equipment expense, dolls.[2]	2.00
Depreciation, dolls.	7.00
Miscl. costs, dolls.[3]	1.75
Production:	
Hours of work[4]	1,000

[1] Corn stover may be substituted for a part of the hay, two pounds for one, during late fall and early winter. [2] See footnote 5, Table 47. [3] Includes shoeing, veterinary, medicine and salt. [4] Used on farm.

The seasonal distribution of man labor on work horses is shown in Figure 21. The man labor requirements are distributed fairly evenly thruout the year, being slightly heavier during the seasons when horses are worked most.

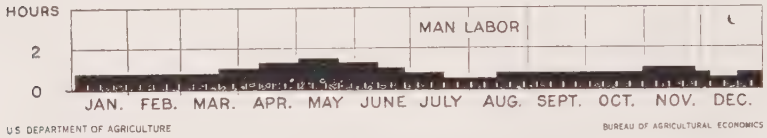

Fig. 21. Work stock: Seasonal distribution of man labor, per head.

BALANCING CROPS AND LIVESTOCK

An important problem in the Purchase is the proper balancing of feed crops and livestock. If livestock and livestock products are to be produced economically most of the feed must be grown on the farm. Legumes and pastures must be included to provide good rations and to improve or maintain the fertility of the soil.

In deciding upon the kinds and amounts of livestock that can be most profitably kept on a given farm it is necessary to know the approximate amounts of land, man labor, horse work and cash costs required to provide feed and care for each. It is also important to know the amount of land that must be cultivated and the amount that can be kept in hay and pasture.

The approximate acres of feed crops and pasture required to provide the necessary feeds for given units of the principal kinds of livestock are shown in Table 67. Also shown in this table are the amounts of man labor, horse work and other costs needed to grow these feeds, and the amounts of man labor and horse work used in caring for the animals, as well as the costs of purchased feeds. These requirements are based upon feed combinations and assumed relative prices shown in the preceding livestock sections. To provide the home-grown feeds for one cow, for example, requires approximately one-half acre of corn, one-half acre of soybean hay, two-fifths of an acre of mixed clover hay and 2 acres of pasture. Eighteen hours of man labor and 18 hours of horse work will be required to grow the corn, 10 hours

TABLE 67. Summary of Livestock Requirements, Including Requirements for Growing Feed Crops and Pasture.

	Cultivated Land	Hay and Pasture Land	Man Labor	Horse Work	Cash Costs and Value of Products
	Acres	Acres	Hrs.	Hrs.	Dolls.
Requirements for one dairy cow[1]					
Corn, 16 bus.	.46		18.0	18.0	2.51[2]
Bran and shorts, 200 lbs.					3.60
Cottonseed meal, 100 lbs.					2.20
Soybean hay, 1500 lbs.		.5	10.0	17.5	1.88[3]
Mixed clover hay, 1000 lbs.		.4	4.5	5.0	3.94[4]
Corn stover, 1000 lbs.					
Pasture		2.0	1.0		.50[3]
Care of cow			150.0	10.0	
Other costs[5]					7.00
Total	.46	2.9	183.5	50.5	21.63
Production: Milk, 5000 lbs.					105.00
Requirements for 12 mature sheep, and lambs[1]					
Corn, 18 bus.	.51		13.8	21.4	2.64[2]
Linseed meal, 30 lbs.					.90
Mixed clover hay, 3900 lbs.		1.6	17.2	18.7	15.35[4]
Pasture		4.8	13.2	24.0	4.80[3]
Care of flock			72.0	18.0	
Other costs[5]					3.72
Total	.51	6.4	116.2	82.1	27.41
Production: Lambs, 840 lbs.					84.00
Old sheep, 132 lbs.					3.96
Wool, 84 lbs.					30.24
Total					118.20
Requirements for one sow, and pigs[1]					
Corn, 112 bus.	3.2		86.4	134.4	16.48[2]
Tankage, 320 lbs.					12.48
Pasture		1.5	.8		.40[3]
Care of hogs			80.0	16.0	
Other costs[5]					3.92
Total	3.2	1.5	167.2	150.4	33.28
Production: Pigs (8), 1600 lbs.					140.00
Requirements for 30 chickens, and chicks[1]					
Corn, 35 bus.	1.0		27.0	42.0	5.17[6]
Bran and shorts, 600 lbs.					10.80
Meat scrap, 150 lbs.					6.75
Baby chick feed, 60 lbs.					3.00
Oyster shell, 120 lbs.					1.20
Care of flock			120.0	9.0	
Other costs[5]					6.30
Total	1.0		147.0	51.0	33.22
Production: Eggs, 270 doz.					67.50
Fryers, 120 lbs.					31.20
Hens, 120 lbs.					21.60
Total					120.30

[1] The requirements shown include the land, man labor, horse work, and other costs used in providing the following feed combinations: dairy cows, combination 1, Table 47, page 401: sheep, combination 1, Table 54, page 410; hogs, combination 2, Table 59, page 416; poultry, combination 3, Table 64, page 423. [2] Includes cost of superphosphate and equipment expense. For dairy cows twine is also included. [3] Cost of seed and equipment expense. [4] Cost of seed, limestone, and equipment expense. [5] Includes building and equipment expenses and direct miscellaneous costs for livestock. [6] Includes cost of grinding 10 lbs. of corn, superphosphate, and equipment expense.

of man labor and 17.5 hours of horse work to grow the soybeans, 4.5 hours of man labor and 5 hours of horse work to grow the mixed clover hay and 1 hour of man labor to seed the pasture needed in addition to that obtained from the fields harvested for hay. Normally the other costs for growing these crops are about as follows: Corn $2.50, soybean hay $1.88, mixed clover hay $3.90 and the additional pasturage $.50. For the feed combination indicated bran and shorts will cost about $3.60, cottonseed meal $2.20 and other expenses about $7.00.

The requirements are worked out in a similar manner for 12 mature sheep, with 13 lambs, one sow and 8 pigs, and 30 mature chickens. In the case of sheep and poultry the numbers indicated were decided upon because the value of the product above the cash expenses is approximately the same as that for one dairy cow or one sow and 8 pigs.

Another important problem in the Purchase is to determine the proper combination of crops and livestock if cash crops are included. In some sections this is comparatively simple since the only crops sold are the surplus feed crops. However, conditions in the Purchase are such that on most farms the net returns are increased by including, in addition to the feed crops, one or more cash crops. That is, on most farms there are other crops that usually are more profitable than corn and hay if the latter are sold. As is well known, dark tobacco was formerly the principal cash crop of the section. In recent years most farmers who have grown other cash crops along with tobacco have obtained better returns than those who have continued to rely upon tobacco alone. In some cases all of the tobacco has been profitably replaced by other cash crops. Strawberries, sweetpotatoes, tomatoes, peaches, apples and dewberries have been grown advantageously in various sections of the Purchase. On many farms two and in some cases three of the above cash crops have been grown profitably along with the feed crops and livestock.

The requirements in acres of land, hours of man labor and horse work, and value of products above cash expenses for given units of the principal cash crops and livestock of the Purchase are shown in Table 68. In the case of crops the calculations are

based on data as to the normal requirements, yields and assumed relative prices for cash crops shown in the preceding sections. In the case of livestock the totals are brought forward from Table 67. The acres of land, hours of man labor and horse work and other costs for growing the feed crops are included in each case, as well as the acres of pasture, hours of man labor and horse work and cash costs used directly for the livestock. Under conditions such as those described in the preceding sections the chances appear about equal for a return above cash costs of approximately $80 from one acre of tobacco, $105 from one acre of strawberries, $85 from 1.5 acres of sweetpotatoes, $95 from 1.5 acres of tomatoes, $85 from one dairy cow, $90 from 12 sheep and 13 lambs, $110 from one sow and 8 pigs, and $85 from 30 chickens. In other words, the information available indicates that on most farms, over a period of years, the value of the products above cash expense for these units will be approximately the same.

TABLE 68. Costs and Returns for Given Units of Crops and Livestock (Based Upon Normal Requirements, Production and Assumed Relative Prices.)

	Cultivated Land[1]	Hay and Pasture Land[1]	Man Labor[2]	Horse Work[2]	Cash Expenses[3]	Value of Products	Value of Products Above Cash Expenses
	Acres	Acres	Hrs.	Hrs.	Dolls.	Dolls.	Dolls.
1 acre tobacco	1.0	.....	250	90	18	95	77
1 acre strawberries[4]	1.0	.5	135	68	106	210	104
1.5 acres sweetpotatoes	1.5	.....	210	150	9	94	85
1.5 acres tomatoes	1.5	.....	240	180	10	105	95
1 dairy cow[5]	.5	2.9	184	50	22	105	83
12 mature sheep and lambs	.5	6.4	116	82	27	118	91
1 sow, 8 pigs	3.2	1.5	167	150	33	140	107
30 chickens and chicks	1.0	.....	147	51	33	120	87

[1] For livestock, acres shown include land used for producing feed crops and pasture. [2] For livestock, hours shown include man labor and horse work for producing feed as well as work on animals. [3] Includes building and equipment expenses. [4] The .5 acre of land under hay and pasture is idle land after strawberries are harvested; that is, it usually requires 1.5 acres of land in berries for each acre harvested. One-half of the costs and returns for an acre of berries for two harvesting seasons is shown. The man labor and horse work requirements shown exclude picking and grading. Charges for these operations are included in cash expenses. [5] No charge is included for depreciation on dairy cows; neither is credit allowed for manure. Roughly these items offset each other.

The requirements for these enterprises differ greatly even when compared on the basis of units for which the value of the product above the cash expenses are approximately equal. Some enterprises require more cultivated land than others, some more land in hay, some more pasture, others more man labor and others more horse work. Some enterprises improve the soil, others impoverish it. The seasonal requirements of man labor and horse work are different. Each of these enterprises in some way complements and supplements all the other enterprises.

On the other hand every acre of a given crop and every unit of a given class of livestock competes directly with every other unit of the same enterprise. With a large acreage of one crop or a large number of one class of livestock it is impossible to give each unit attention when a given amount of attention will give best results. Often a part of an acreage of a crop planted at the most advantageous time, on land especially suited to the crop and receiving timely attention during the cultivating and harvesting seasons will show large profits, and the remainder of the crop planted on less desirable land, at a less advantageous time and receiving less timely attention will be produced at a loss.

With so many enterprises adapted to the section the returns from a system of farming with a single source of income usually will be considerably less than the returns obtained from the better balanced systems. To illustrate, consider a sixty-acre farm on which tobacco is the only important source of income. Six acres of tobacco are about all that one man working alone can handle, in addition to the feed crops for the work stock and the fruits, truck crops and livestock products for use in the home. He will not be kept busy during the entire year but the peak loads in May, June, August and September will be such as to prevent him from handling more than six acres of tobacco. With tobacco at 10 cents per pound the total income above cash expenses from such a system will probably be less than $500 in most years. If he is favorably situated for growing strawberries and decides to depend upon this crop as the only important source of income he will alone probably be able to handle 6 or 7 acres in addition to feed crops for the work stock and products

for the home. If he decided to depend upon dairy products as the only important source of income he can, on a 60-acre farm, by using lime, phosphate and providing good pastures, probably grow most of the feed and handle 8 or 9 cows in addition to feed for the work stock and products for the home. In either case, under ordinary conditions, his income above cash expenses would probably be less than $800 per year.

On the other hand, one man alone can grow 4 acres of tobacco or 4 acres of strawberries, produce most of the necessary feeds and handle 6 cows and 60 chickens. Or he can raise 3 acres of tobacco and 2 acres of strawberries, keep 4 cows, 60 chickens and one sow and, in addition, grow the feed crops for the work stock and the products for the home. In either case, under ordinary conditions, his income above cash expenses will probably be above $1000 per year. The labor requirements during the growing season will be no larger and the peak loads perhaps less than the requirements for systems based upon a single enterprise. Obviously, the net returns will be more nearly the same from year to year when the income is obtained from a number of important sources.

The first step in working out the proper balance between cash crops, feed crops and livestock is to decide upon the crops and livestock that are to be the major sources of income. On most farms in the Purchase there should be at least one cash crop and one class of livestock as important sources of income. When the major enterprises have been selected the amount of fruit, garden and truck crops and milk, pork and poultry needed in the home should be provided for. Finally, it will be advisable to arrange for such minor crops and livestock as will utilize to best advantage the land, feed crops, the time of the men and teams and the nonmarketable products such as straw, stover, pastures, and skim-milk not needed in conducting the major enterprises or in providing products for the home. The crops and livestock that will prove most profitable on a particular farm will depend largely upon the location of the farm and fertility of the soil, kind and amount of labor available and the special aptitudes and qualifications of the farmer.